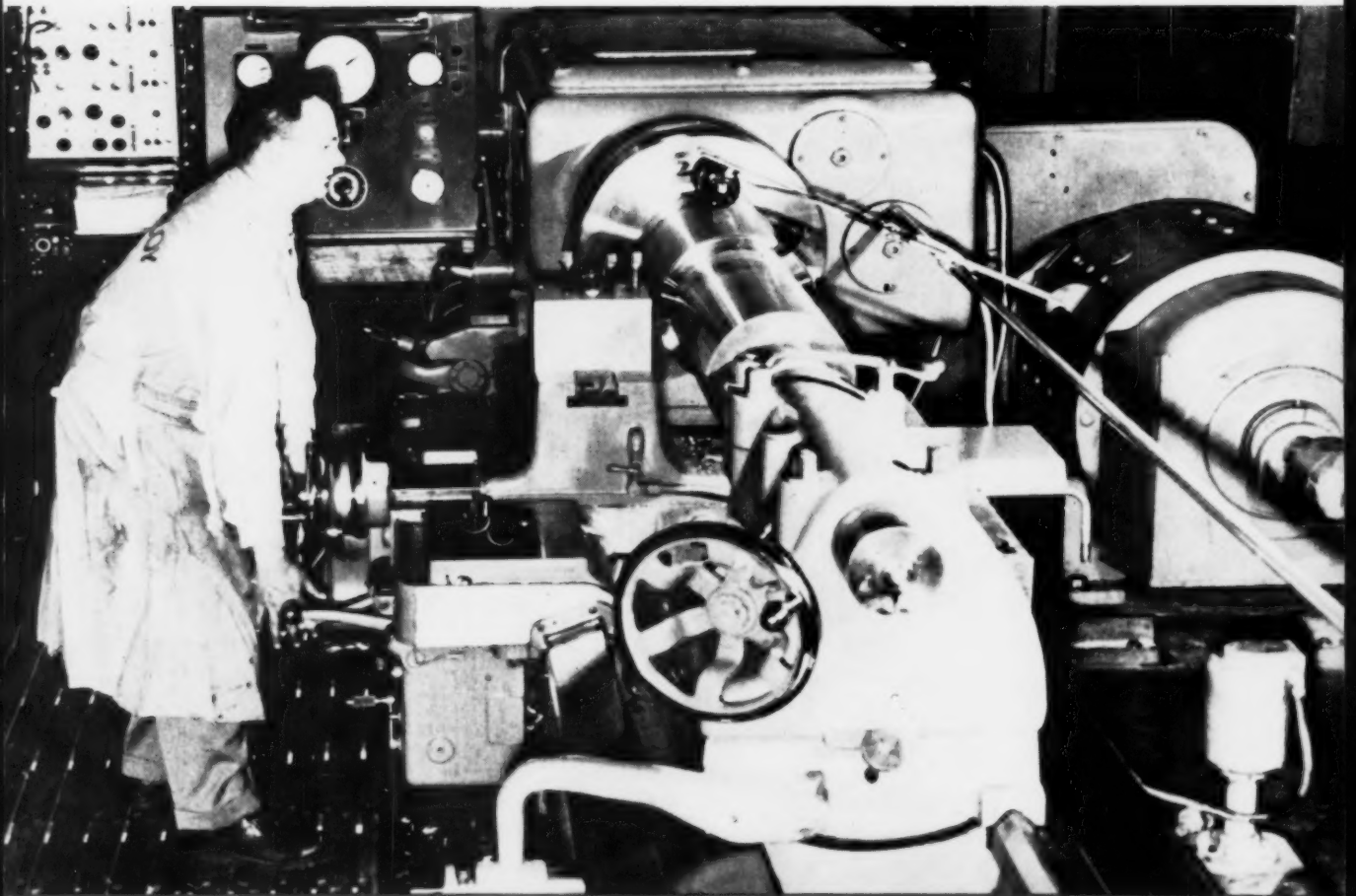


February 28, 1957

The IRON AGE

The National Metalworking Weekly



Machinability: Science or Fiction? P.75

New Welding Process For Aluminum P.86

What Steel Union Fracas Means To You P.35

Digest of the Week P-2



BRAINSTORMING FOR A STEEL BUY

V. P.— PRODUCTION:

"Gentlemen, cost is a very important factor in these new machine parts. Our customers will not pay more for the product, so we've got to produce it for less."

SUPERINTENDENT:

"The production schedules are set up for long runs. If we can figure out some way to save money on the machining operation and on tools, we can lick this problem."

CHIEF DESIGN ENGINEER:

"We've got the design worked out for an absolute minimum of machining operation. The answer is going to have to be to increase our feeds and speeds and figure out how we can save money on tools."

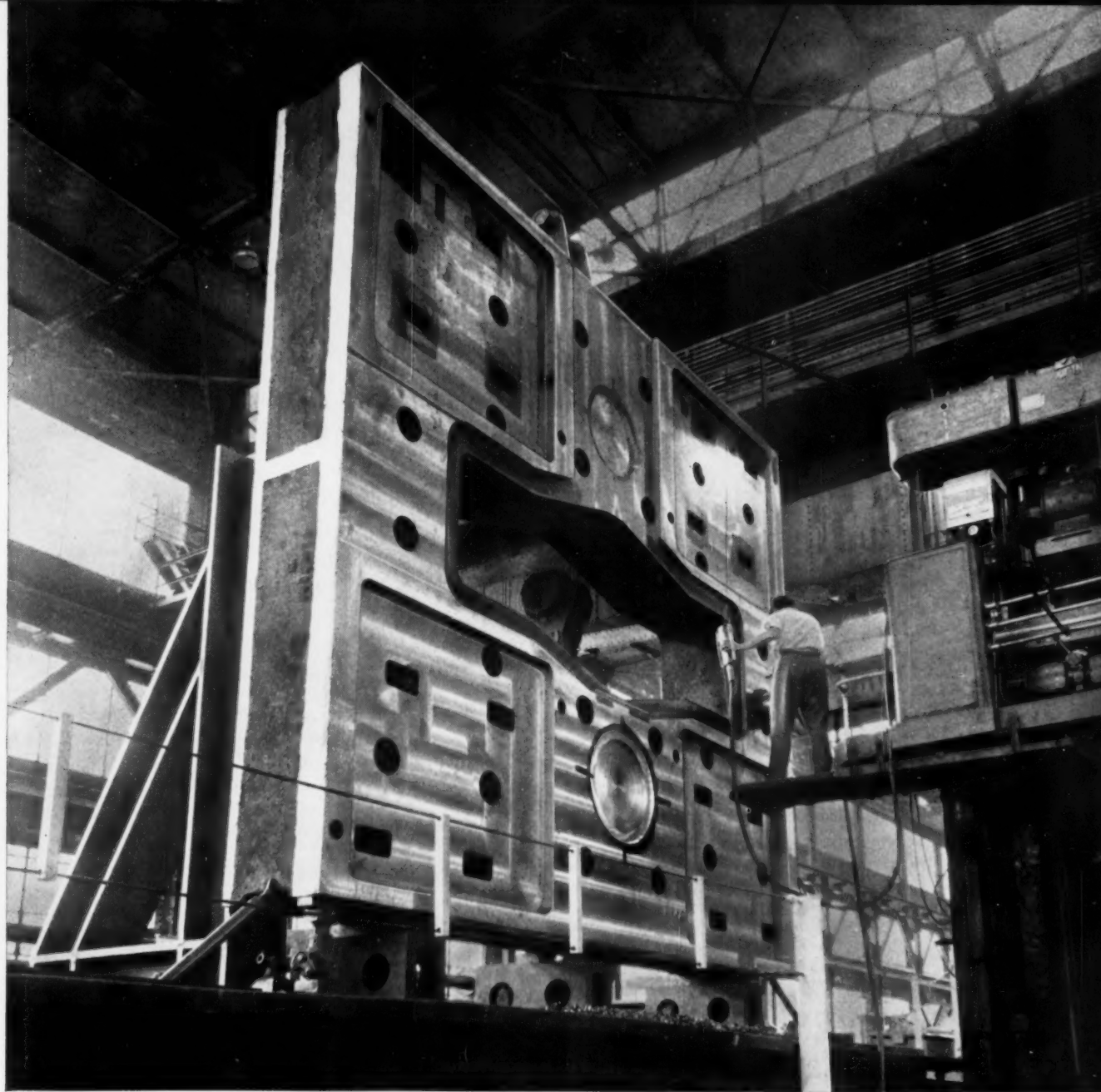
STEEL BUYER:

"The answer is obvious. We'll use a Copperweld Leaded Alloy. The tiny particles of lead in the steel act like a lubricant. It will cut our machining time by as much as $\frac{1}{3}$, and can increase tool life as high as 100%. It may even eliminate the final finishing operation."



COPPERWELD STEEL COMPANY • STEEL DIVISION • WARREN, OHIO

EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.



95-ton casting for counterblow forging hammer

This steel casting is of interest for several reasons, not the least of which is its size. By any standards it is a big one—approximately 223 in. long, 202 in. wide, 28 in. deep. As you see it here it has been planed on both sides, and the pockets on the side facing the camera have been milled out.

The huge casting will be used as the base plate of a counterblow forging hammer. The intricate piece was cast in one of the Bethlehem foundries, then moved to a neighboring

Bethlehem shop for machining. The plans called for a finished weight of 189,000 lb—almost 95 tons.

Heavy castings like this have been a Bethlehem specialty for years. In design they have ranged from the very simple to the highly complex and difficult. You will almost always see many unusual types of castings in Bethlehem's foundries and machine shops, which are equipped to

handle an unlimited variety of work.

If your own jobs require steel, iron, or bronze castings, large or small, we suggest that you be sure to investigate the services Bethlehem offers. They leave nothing to chance. When you are next in the market, we will welcome your inquiries.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



The IRON AGE

Feb. 28, 1957—Vol. 179, No. 9

Digest of the Week in Metalworking

Starred items are digested at right.

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NEWS DEVELOPMENTS

A "NEW" McDONALD IS IN THE MAKING

P. 35

The "close" election for presidency of steel union has toughened Dave



McDonald's philosophy. Watch for a firmer hand in union affairs.

BLAIRSVILLE COMBINES RESEARCH AND PROFITS

P. 38

Westinghouse facility is a pilot plant for new metals. But it also produces alloys and castings for commercial use. Production operations offset cost of pilot plant work. But cost of such a project would be prohibitive for most companies.

EXECUTIVE RANK HAS ITS PRIVILEGES

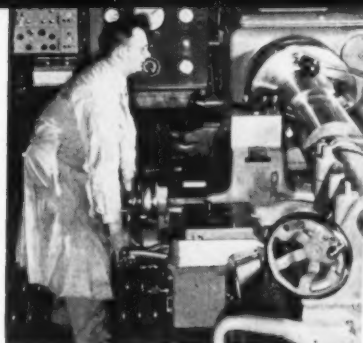
P. 39

Companies realize it takes more than a base salary to keep top management. Retirement programs gain in acceptance. Insurance programs, health plans are also widely used. Expense accounts, membership in social and professional clubs are other benefits.

TITANIUM PRICES ARE COMING INTO REACH

P. 40

Cost cutting projects promise much lower producing costs. New aircraft uses prompt producers to double output. New methods of utilizing scrap are big factor in cutting costs. Producers make progress in developing own production facilities.



MACHINABILITY TESTING, the new science of measuring metal-cutting efficiency, has come a long way in a short time. A special report, starting on P. 75, explains how the latest scientific instruments are used to improve cutting operations, not only in the laboratory, but on the machine shop floor.

SCRAP EXPORTS MAY ESCAPE QUOTAS

P. 41

Pressure being exerted by the U. S. State Dept. makes unlikely the prospect of quotas for foreign scrap shipments—for the immediate future, anyway. But the Dept. of Commerce is limiting major foreign buyers to 1956 tonnages with threat of controls if they buy over that amount.

FEATURE ARTICLES

HOW FLUIDS AFFECT GRINDING WHEEL PERFORMANCE

P. 79

There's no doubt that grinding fluids do affect wheel performance. The question is "How Much?" A test of 76 fluids in a variety of machines, carried out by the Carborundum Co., shows effects on wheel wear, power used, finish, cutting rate and amount of metal removed. The fluids included gases, water emulsions, and oils.

CARBURIZE, MARTEMPEL PARTS IN SINGLE-LINE SETUP

P. 82

One of the latest layouts in heat treating plants is exhibited by Evinrude Motors, Detroit. It centers around a mechanized salt bath line for the combination carburizing and martempering of outboard motor crankshafts. One line proved so successful that four more have since been added.

TRY SHELL MOLDS FOR LOW VOLUME CASTING

P. 84

Usually, shell mold casting is regarded as a mass production technique. But at times it can be the best way to handle short run jobs—especially where other production methods are slow and complex. Whether or not this holds true for you will depend on circumstances. It is possible to show a profit casting as few as 1600 parts in shell molds.

FORGE WELDING JOINS ALUMINUM ALLOYS

P. 86

Weld heat destroys wanted properties in heat treatable aluminum alloys. Even a post-weld heat treatment doesn't always destroy them. Still, the light, high-strength structurals that these alloys make possible are desirable. With high-strength aluminum alloys, a new welding process may be the answer.

DRAW AND POLISH BAR WITH ONE MACHINE

P. 88

Most mills cold-draw and straighten bars separately. They accept the resulting surface without added polishing. But bar quality requirements are bound to continue tightening. A single machine now cold draws, cuts off, and straightens bar; throws in polishing as a cost-free extra.

MARKETS AND PRICES

AUTO LABOR MAPS 1958 CONTRACT DEMANDS

P. 52

The short work-week and higher pay are getting top billing. Reuther is out to lure rebel skilled labor factions back into the UAW fold. They may be given separate contract considerations. Possibility of a dues increase may stir dissension.

LABOR POLITICAL STRATEGY SHAPES UP

P. 57

Working through friendly congressmen, union leaders aim to pin an "unjustified price increases" label on industry. They hope it will justify their own demands for higher wages. The strategy is to insist on public hearings.

WEST COAST WAREHOUSES ARE BUSY PLACES

P. 59

Steel distributors in that area are selling 25 pct of domestic steel tonnage, while national warehouse average is only 21 pct. Gains in population, large increase in number of industrial jobs are factors in area's booming economy.

NEW TOOLS WORK AN ADVANTAGE IN SOUTH

P. 61

Southern metalworking firms are getting a flying start with modern equipment. Their efficiency records are almost unprecedented. It suggests modernization programs are needed in other sections of the country.

THE STEEL BARK IS WORSE THAN THE BITE

P. 115

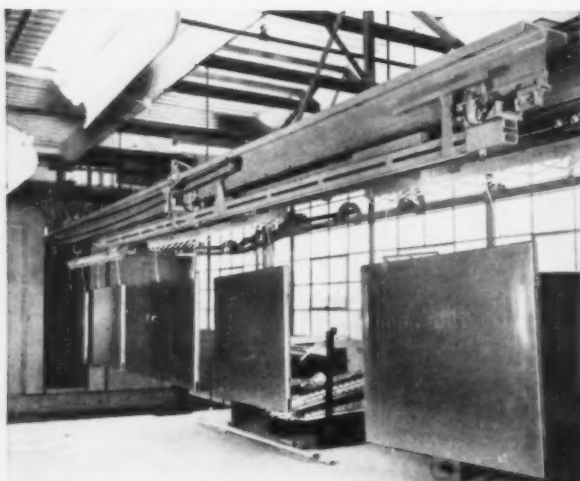
There's no doubt that demand for some steel products is off. But the pessimistic talk is out of proportion to actual conditions. Second quarter production will be close to 90 pct.

NEXT WEEK:

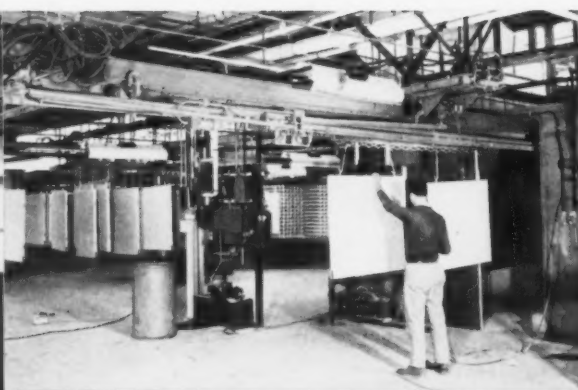
PRODUCTIVE RESEARCH TAKES REAL PLANNING

It's important to have a good research program. But unless you do some planning, it's like pouring money down the drain. So says GE's Dr. Guy Suits in a thought-provoking article crammed with practical ideas.



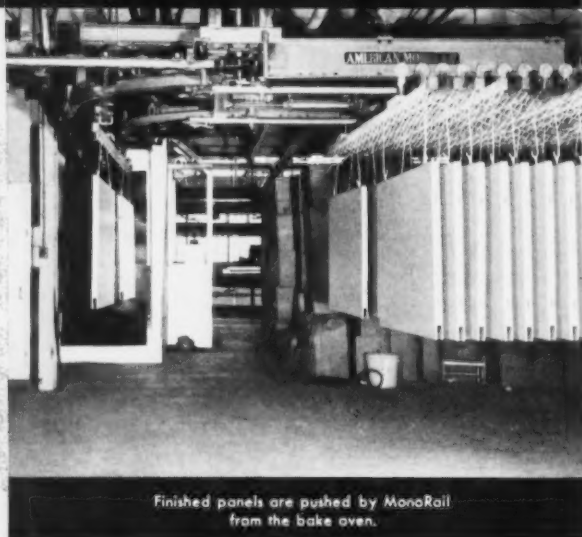


Landahl picks up panels as MonoRail pushes them from degreasing.



MonoRail pneumatically pushes a "car" of panels into a finish spray booth.

Automatic Finishing with Power **LANDAHL** and **AMERICAN MONORAIL**



Finished panels are pushed by MonoRail from the bake oven.

Space was saved and automatic finishing achieved by combining two overhead handling systems.

American MonoRail cars carrying metal panels move through degreasing, priming, finishing and baking. In each operation either loading or unloading is performed automatically by power — the Landahl Chainless Conveyor acting as a "pusher" over most of the system.

Here is "team work" engineering to take advantage of the flexibility of both American MonoRail and Landahl Chainless Conveyors.

This efficient system is installed at Fostoria, Mfg. Co., Fostoria, Ohio, for finishing metal panels for office partitions.

For details on how American MonoRail or Landahl Conveyors can cut your handling costs, write today.

Member of The Materials Handling Institute, Inc. & MonoRail Manufacturers' Association.

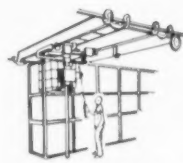
For Power Driven Conveyors, Use Landahl Chainless Conveyors



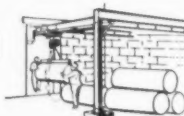
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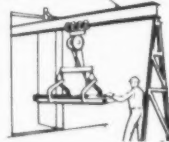
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13103 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

MORGAN
WORCESTER

High Speed Four Strand Rod Mill

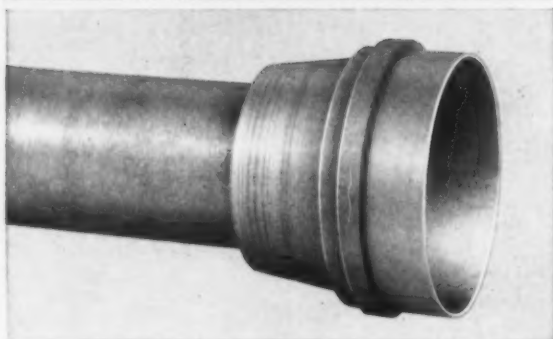
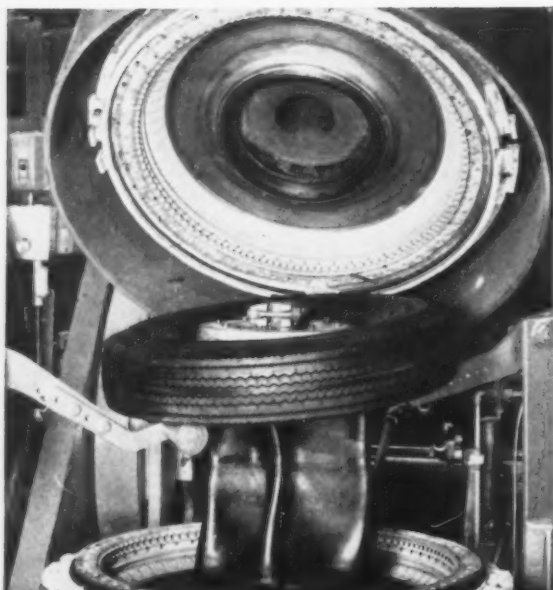
MORGAN WORCESTER MORGAN WORCESTER MORGAN WORCESTER MORGAN WORCESTER MORGAN WORCESTER

UNITED STATES STEEL CORPORATION

MORGAN CONSTRUCTION CO.

ROLLING MILLS MORGOIL BEARINGS GAS PRODUCERS
WIRE MILLS EJECTORS REGENERATIVE FURNACE CONTROL

MORGAN MORGAN MORGAN MORGAN MORGAN MORGAN MORGAN MORGAN
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Core of this tire-curing mold is a center cylinder assembly. This unit moves diaphragm and ring, and strips the cured tire from the bottom half-mold as the press opens. With each stroke of the stainless steel piston within the bronze cylinder, the piston ring, made of Armco 17-7 PH Stainless, scrapes the inside of the cylinder free of foreign matter.

Where ordinary steel failed --- Part made of Special Armco Stainless Fights Rust and Wear--Lasts Longer

Corrosive combinations of steam and sulfur compounds made short work of carbon steel scraper rings previously used in tire-curing presses like this one.

Now, according to the press manufacturer, service life of the scraper ring is "excellent." The reason: Armco 17-7 PH Stainless Steel is now specified.

Here's why rings made of this special precipitation hardening stainless steel last longer.

... Resistance of 17-7 PH to wear and corrosion is much greater than that of carbon steel.

... 17-7 PH rings are extra hard and tough—resist wear from continual action against cylinder walls.

In addition, ability of this special steel to resist distortion in heat treating helps assure accurate dimensions in this close-fitting part.

Problem-Solving Pair

Armco 17-7 PH and its companion precipitation hardening grade, Armco 17-4 PH, are unique among the stainless steels. Parts can be *finish-fabricated* from these special steels in the annealed condition, then given high strength and hardness by simple heat treatment. 17-7 PH is produced in sheet, strip, plate, bar and wire; 17-4 PH in billets, bar and wire.

For full information about these Armco Precipitation Hardening Stainless Steels, just write us at the address below.



Armco Steel Corporation

1027 Curtis Street, Middletown, Ohio

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



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Indexed in the Industrial Arts Index
and the Engineering Index.



The Price of Survival Comes High!

♦ THERE IS SOME budgetary daydreaming in and out of Wash-
ington. A lot of it is wishful thinking. Everyone wants the Federal
Budget cut. But if those who made it up and those who control it
can't cut it, certainly you and I can't do it.

Our defense costs are going through the roof. Those who say
they aren't either don't know the facts of life or haven't done
their homework.

Don't expect that nations will suddenly love and cherish each
other. They won't—in the foreseeable future—disarm and spend
“protection” money for the finer things of life.

Our allies are trying to find some way to decrease their defense
load—by having someone else pay the freight. Part of this is due
to the cold hard fact that our major friends are no longer the world
powers they were at one time.

As a side issue to our defense costs we have another heavy
“security” expense. Millions of people have reached the age where
they want protection against want, emergencies and abandonment.

Anyone can yell for a cut in taxes; point with alarm to the big
budget and generally insist that “something be done.” They may
even blame the “people.” But the people usually follow the leader.
If they don't like where he takes them, they dump him and get
another one.

Global defense and domestic security are paid for with taxes.
Taxes come from business, payrolls and your pocketbook. The cost
of defense is going up; so is the cost of social “security for all.”

The older population is increasing rapidly. So is the very young
group. That leaves a relatively smaller group of workers upon
whose backs these high costs will rest.

They need more machinery, more tools and more engineering if
they are not to fall on their faces. You can't have defense in today's
box-car figures unless you have a big-time economy from which to
scoop the taxes.

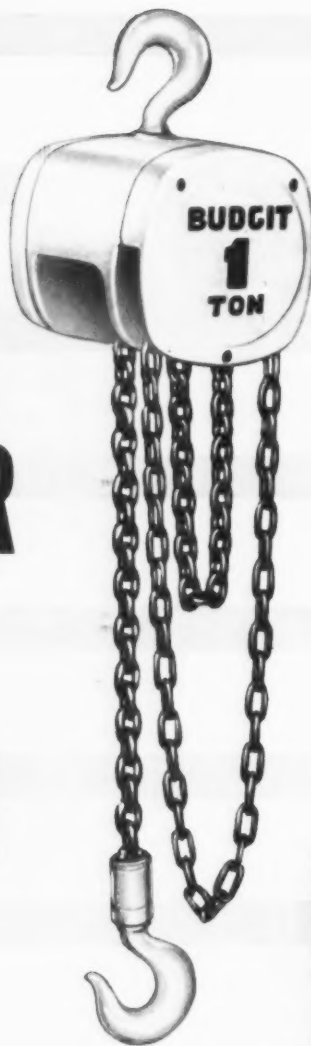
There is no road back: Not until Communism fades from the
earth. We need prosperity if we are going to get the butter which
pays for the guns.

Let's face it. The price of survival comes high!

Tom Campbell

EDITOR-IN-CHIEF

SHOW ME YOUR TOUGH LIFTING JOBS!



Here's the hoist to handle them in a hurry. It's the 'Budgit' Aluminum Chain Block. Talk about easy pull; this hoist really has it. One man can lift a 500 lb. load with only 25 lbs. of muscle effort. The $\frac{1}{2}$ -ton size weighs only 29 lbs. Easy to carry anywhere a fast lift is needed.

The 'Budgit' Aluminum Chain Block takes hard knocks because super-strength is built into every part from top hook to load hook. Extra safety and efficiency is provided by the big "full jeweled" load brake. It's a fast-acting, automatic brake that makes lowering so smooth and easy loads can be "spotted" with hairline accuracy.

Put the money-saving advantages of the 'Budgit' Aluminum Chain Block to work for you. Spark-resistant models are available for use where such a safeguard is essential. Capacities: $\frac{1}{4}$ to 10 tons. Call your nearby "Shaw-Box" Distributor for details or write us for Bulletins 405 and 415.



***'Budgit'* CHAIN BLOCKS**

MANNING, MAXWELL & MOORE, INC.

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Builders of "SHAW-BOX" and "LOAD LIFTER" Cranes, "BUDGIT" and "LOAD LIFTER" Hoists and other lifting specialties. Other Divisions produce "ASHCROFT" Gauges, "HANCOCK" Valves, "CONSOLIDATED" Safety and Relief Valves, "AMERICAN" and "AMERICAN-MICROSEN" Industrial Instruments, and Aircraft Products.

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I-Beam Trolleys, equipped with ball bearing wheels are available in standard and spark-resistant designs. Plain and hand geared types. Capacities to 20 tons.



Safety Hooks are available to "lock in" slings and other attachments used to support loads. All capacities.



Carrying Case. Heavy canvas riveted to sturdy base plate. Has zipper and leather handle. For 'Budgit' Aluminum Chain Blocks up to 1 ton.

dear editor:

letters from readers

Worker Training

Sir:

I wish to congratulate you on the excellent manner in which your Feb. 14 article, "How To Build Your Skilled Labor Force," was prepared and presented.

On behalf of the U. S. Dept. of Labor and the Bureau of Apprenticeship and Training, I wish to extend our sincere thanks for your presentation. I feel certain that it will aid immeasurably in our efforts. *J. D. Dolan, Area Supervisor, U. S. Dept. of Labor, Bureau of Apprenticeship and Training, Phila., Pa.*

Fond Farewell

Sir:

It is with regret that I take this means of advising you to cancel my subscription to THE IRON AGE when it expires in April.

I say it is with regret. I have been a reader of your excellent magazine for more than 25 years. My reason for giving it up is because I am now retired, and as much as I would like to continue, I find my budget is too small.

However, I will continue to talk up your magazine wherever I can, and get new subscriptions, primarily because THE IRON AGE has done so much for me.

Best wishes for your wonderful magazine for years and years to come. *C. C. Sickels, Phillipsburg, N. J.*

Navy Goes For Simpler Drafting

Sir:

Your article "How to Simplify Engineering Drawings" in the Dec. 27 issue proved to be both interesting and timely at the New York Naval Shipyard. This shipyard, like private industry, is taking positive steps to increase the effectiveness of engineering and drafting personnel by inaugurating a Func-

tional Engineering Practices Program. Similar programs are underway in all other Naval Shipyards.

The most significant phase of this program is the promotion of functional drafting. The basic rules of Functional Drafting are similar to those for simplified drafting as adopted in most firms doing engineering work. Pamphlets containing these rules are being distributed to all drafting and engineering personnel during short indoctrination sessions. A committee, with representatives from all Design Division branches, serve as advisors to the men on the drafting boards.

To assist us in increasing our drafting efficiency, we would appreciate receiving twenty-five copies of your article for distribution to our committee and our technical library. *J. I. Gifford, Branch Head, Value Engr., New York Naval Shipyard, New York, N. Y.*



THE IRON AGE

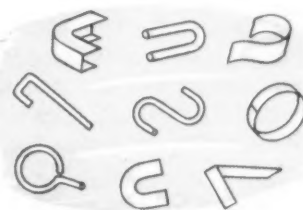
"Just give me a temperature reading . . . I don't care about cooking a cheese soufflé."



**HIGH SPEED
PRECISION BENDING
with DI-ACRO*
Hydra-Power
Bender!**

Simple and complex bends are readily formed and duplicated in many ductile materials with hydraulically operated Di-Acro Benders. The Bender can be delivered completely tooled for bending moulding, extrusions and other solid materials. Tooling can be made in your own plant if you prefer.

**pronounced Die-ack-ro*



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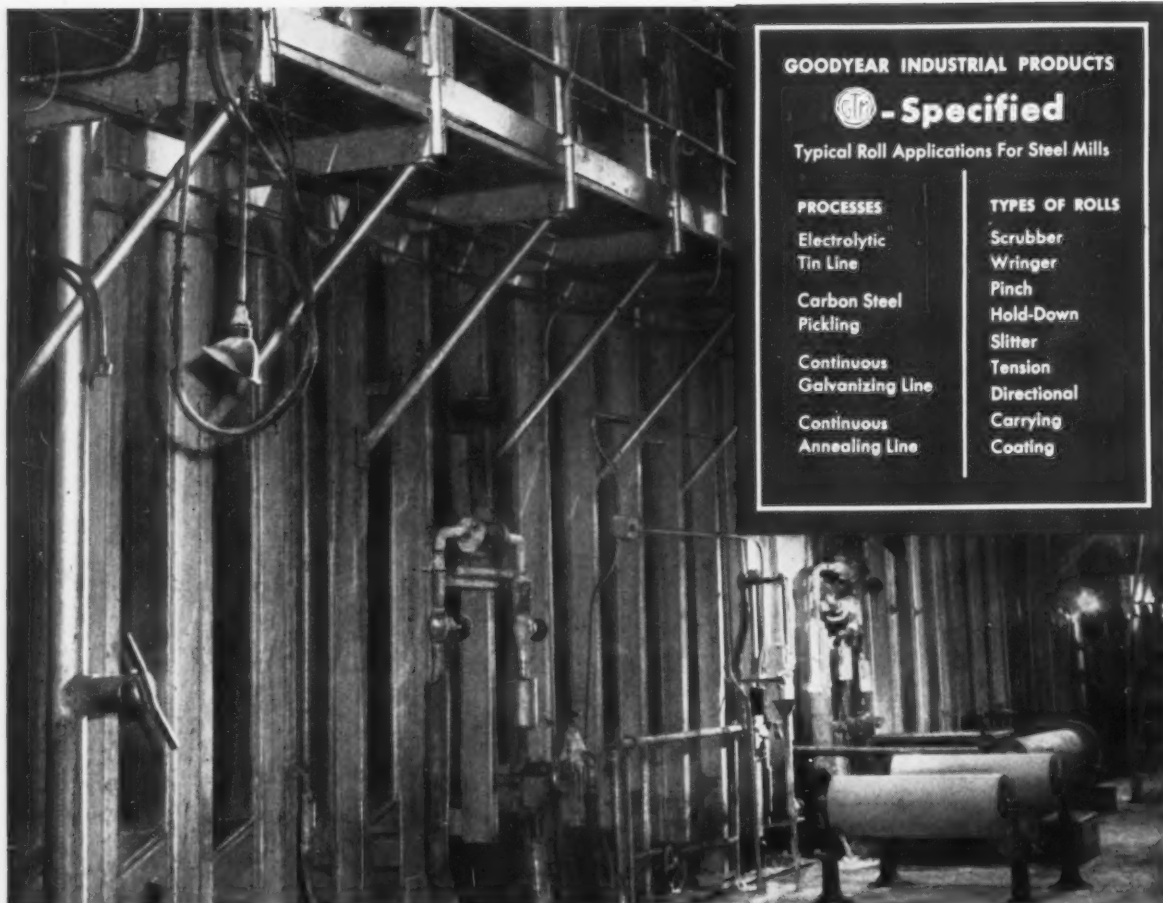
New catalog gives complete details on all hand and power operated Di-Acro machines.

Consult the yellow pages of your phone book for the name of your nearest Di-Acro distributor or write us.


Creators of
"Die-Less Duplicating"

O'NEIL-IRWIN MFG. CO.
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LAKE CITY, MINN.





GOODYEAR INDUSTRIAL PRODUCTS

 - Specified

Typical Roll Applications For Steel Mills

PROCESSES

Electrolytic
Tin Line

Carbon Steel
Pickling

Continuous
Galvanizing Line

Continuous
Annealing Line

TYPES OF ROLLS

Scrubber
Wringer
Pinch
Hold-Down
Slitter
Tension
Directional
Carrying
Coating

G.T.M. More than doubles life of tin line rolls

ABOUT 18 MONTHS was considered excellent service for the rubber covered rolls in the plating compartments of this tin line. Abrasion and cutting plus constant immersion in approximately 200° F. sodium stannate solution were the life-limiting factors.

Then rolls specified by the G.T.M.—Goodyear Technical Man—were put to the test. They served an average of 3 years and 7 months—were worn

down only $\frac{1}{16}$ " in turning out 4,000,000 base boxes or 71,000 miles of tin plate. And with re-grinding they'll be ready for many miles more!

The G.T.M. may well have a similar answer to your rubber covered roll or other industrial rubber problems. Why not find out by contacting him through your Goodyear Distributor? Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

RUBBER COVERED ROLLS by

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."

fatigue cracks

Open Letter To Car Engineers

The opus below was composed by Clarence F. Smart, recently retired metallurgist for G.M.'s Pontiac Div. He is now in Florida. But we thought you'd get a kick out of his farewell salute to all members of the engineering fraternity.

Dear Engineers:

*After thirty-five years
Spent with car engineers
Expounding on stresses and strain
I've reached the conclusion
That there is confusion
Still fogging up some of the brains.*

*You make slide-rule guesses
Concerning the stresses
Affecting the parts you design,
And if these give trouble
You look at the rubble
Protesting the trouble is mine.*

*How often I mention
That parts used in tension
Fatigue when they're loaded too much
But this has no bearing
Each engineer swearing
That his parts could never be such.*

*I make explanations
That stress concentrations
Make stresses abnormally high—
"If metals were stronger
The parts would last longer"
Is what you so aptly reply.*

*Exposing the knowledge
They taught you in college
You claim that you know very well
"To make iron stiffer"
(And here's where we differ)*

*"Requires a higher Brinell."
The fact still remains
That iron and brains
Together make automobiles
The less of one—brother—
The more of the other*

Or they don't stay up on their wheels.

*Although metallurgy
Is not thaumaturgy
It aims to assist engineers—
Before you start yelping
It's right in there helping
To bring you successful careers.*

*Wild guesses, or magic
Are woefully tragic,
The answers lie not in the cards
So strictest compliance
With dictates of science
Is proffered, with my best regards.*

Machinability: Science or Fiction?

IRON AGE readers are bound to guess, without prompting that we'd have no truck with machinability testing if it were purest fiction without a speck of science.

So we'll come right out and tell you that the title for our cover article was chosen for its provocativeness. We're certain you'll find many of the questions raised by the article equally provocative. Why, for example, aren't more machine shop people digging into that potential "gold mine" offered by machinability research? Suggest you turn to p. 75 and read on.

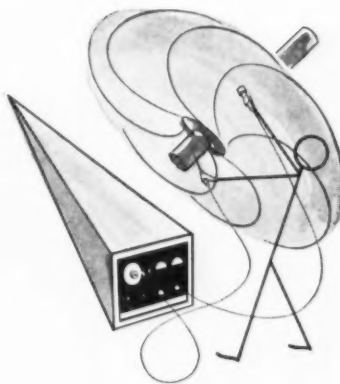
Puzzlers

Big Jim Mull's answer to the train puzzle last week took up so much space we had little room for other possible winners: Here they are: Joe Brugman, Rheem Mfg. Co.; D. S. Gleason, Great Northern Railway Co.; Jack Clynes, General Cable Corp.; Berry, Letterman & Vunovic, our old GSCC friends; Peggy Moody, Lone Star Steel Co.

New Faces

Next week your IRON AGE takes on a new look: New cover, new layout, new type faces throughout. Purpose: to make it easier to read. Worth watching for.

WHEREVER A WHEEL TURNS . . .



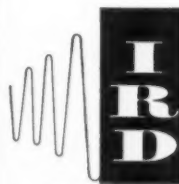
VIBRATION

...limits production machine speeds, lowers product quality, increases product costs, needlessly.

Utilizing IRD electronic vibration analyzers and portable balancing equipment you can quickly detect and correct vibration—introducing a dimension of production efficiency and product quality you may now think impossible. Vibration is a threat to your reputation for quality—no matter what your product or process. Start profiting more tomorrow by detecting and correcting vibration the IRD-way, today.

WRITE TODAY

Ask for Booklet G-1. Discover how hundreds of "blue-chip" manufacturers and cost-conscious small firms are using IRD equipment six ways to increase profits.

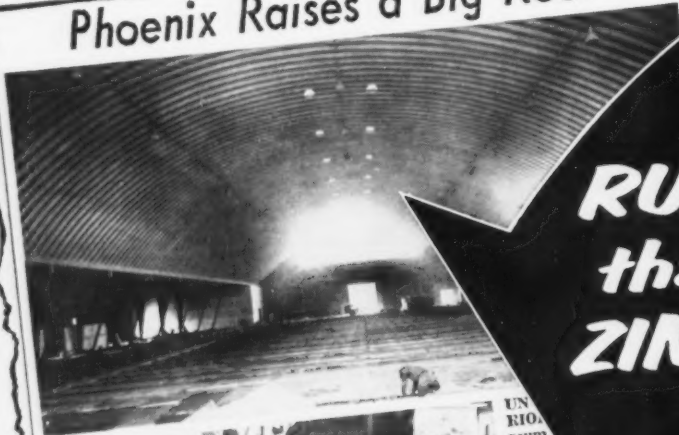


INTERNATIONAL
RESEARCH AND
DEVELOPMENT CORP.

900 THOMAS LANE, COLUMBUS, OHIO

NEW YORK WORLD-TELEGRAM AND SUN, THURSDAY, AUGUST 9, 1956

Phoenix Raises a Big Roof



Also
RUSTLESS
thanks to
ZINC!

Trussless Steel Giant

The erection of the world's largest trussless steel roof, a clear span 120 feet wide and 200 feet long, over the new \$750,000 Phoenix Coliseum under construction in Phoenix, Ariz., was announced today by the Wonder Building Corp. of America.

Called the "Wonder Roof," it is the first in a new line of low-cost, long-span custom-engineered roof decks being marketed by the firm for convention halls, arenas, etc. Costs are said to be one-third less than conventional roof structures.

At the Phoenix Coliseum, the unique roof was completely erected in seven and one-half days.

CURVED SHEETS of corrugated steel are fastened together by nuts and bolts to form the self-supporting arches which make up the new trussless steel roof. Workmen above assemble pre-engineered sections.

Two design features of the roof* of the new Coliseum in Phoenix, Arizona are somewhat unique.

1... the roof is TRUSSLESS, thanks to the use of specially designed curved steel sheets, so assembled as to form a strong, self-supporting arch.

2... the roof is RUSTLESS, thanks to ZINC.

Yes, the roof is galvanized and by the continuous galvanizing process, too, which produces a much better coating... a coating that adheres more strongly to the steel and which permits severe forming operations without damage. With this coating the metal appears to 'flow' with the base metal when being shaped.

BUT... and this is where St. Joe Electrothermic Zinc enters the picture... continuous galvanizing calls for zinc with specially controlled analyses of the other metals. It isn't a question of staying within permissible maximums. It's a question of keeping the other metals within certain specified ranges in order to impart certain desirable characteristics to the zinc and the coating.

St. Joe Electrothermic Zinc is this carefully controlled zinc. It's ideal for continuous galvanizing.

ST. JOSEPH LEAD COMPANY
250 PARK AVENUE, NEW YORK 17, NEW YORK

*Designed, fabricated and installed by Wonder Building Corporation of America, Chicago, Ill.

HIGH GRADE
INTERMEDIATE
PRIME WESTERN

ST. JOE *electrothermic* **ZINC**

dates to remember

MARCH

American Institute of Chemical Engineers — National meeting, March 3-6, The Greenbrier, White Sulphur Springs, W. Va. Society headquarters, 25 W. 45th St., New York.

Society of Automotive Engineers, Inc. — National passenger car, body and materials meeting, March 5-7, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 485 Lexington Ave., New York.

American Machine Tool Distributors' Assn. — Spring meeting, March 6-7, El Mirador Hotel, Palm Springs, Calif. Assn. headquarters, 1900 Arch St., Philadelphia.

EXPOSITIONS

1957 Nuclear Congress — March 11-15, Philadelphia.

American Society for Metals — March 25-29, Los Angeles.

American Foundrymen's Society — May 6-10, Cincinnati.

Pressed Metal Institute — Technical meeting, March 6-8, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

National Assn. of Waste Material Dealers, Inc. — Annual convention, March 10-13, Hotel Conrad Hilton, Chicago. Assn. headquarters, 271 Madison Ave., New York.

Steel Founders' Society of America — Annual meeting, March 18-19, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

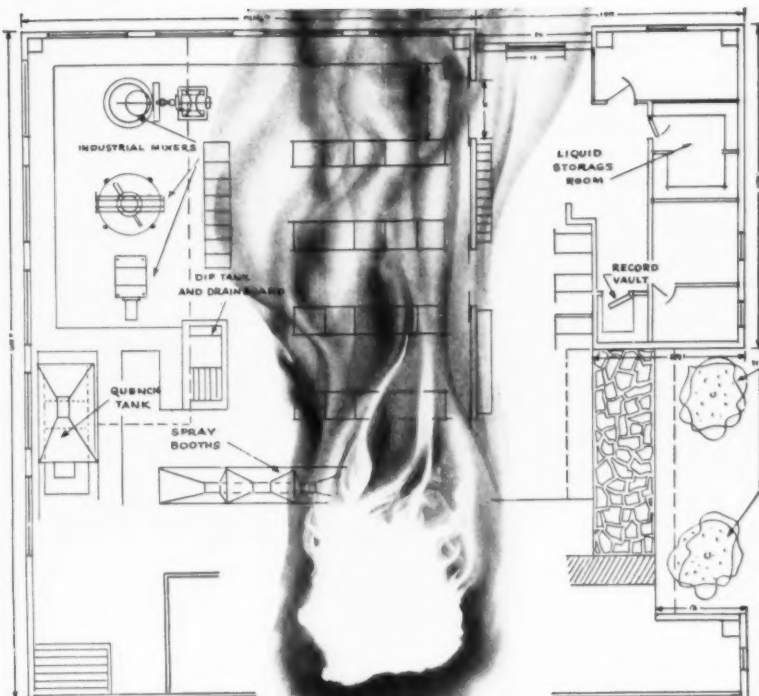
American Institute of Mining, Metallurgical and Petroleum Engineers, Inc. — Regional meeting, March 18-19, Rackham Bldg., Detroit. Society headquarters, 29 West 39th St., New York.

American Society of Tool Engineers — Silver anniversary annual meeting March 23-28, Shamrock Hilton Hotel, Houston, Texas. Society headquarters, 1007 Puritan Ave., Detroit.

APRIL

The American Society of Mechanical Engineers — Spring meeting, April 8-10, Dinkler-Tutwiler, Birmingham, Ala. Society headquarters, 29 W. 39th St., New York.

American Society of Lubrication Engineers — Annual meeting, April 15-17, Sheraton-Cadillac Hotel, Detroit. Society headquarters, 84 E. Randolph St., Chicago.



Where will FIRE start in your plant?

Whatever the hazard, dip tanks, record storage vaults, spray booths, Kidde's carbon dioxide fire extinguishing system protects your plant 24 hours a day, gives you the fastest, safest fire protection ever made! Product of more than thirty years' experience, the Kidde system boasts more features than any other make on the market today. Features like:

All operating parts completely enclosed to guard against fouling or accidental operation.

No clumsy triggering methods or falling weights.

Self-contained; no outside power needed.

Visual indicators to show if system has been operated.

Easy testing of all operating parts.

No parts to replace after operation or test.

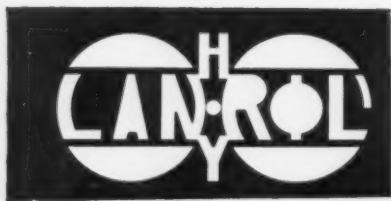
Fast-acting, clean carbon dioxide does the job that no other extinguishing agent can do: snuffs fire out in seconds, then vanishes into thin air. Won't harm valuable machinery, leaves no mess to clean up. Write for Kidde's pressure operated carbon dioxide fire extinguishing systems booklet today.

Kidde



Walter Kidde & Company, Inc.
249 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd., Montreal—Toronto

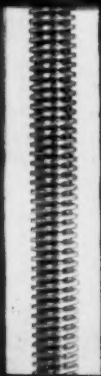


THREAD ROLLING

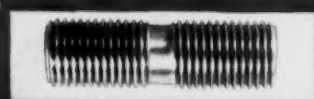
Field installations of the new LANHYROL Thread Rolling Machine are producing outstanding results. Production data from representative jobs, shown on the opposite page, indicate the unequalled output, flexibility, and range coverage of this revolutionary new machine, not available anywhere else in the Western Hemisphere.

The LANHYROL Thread Rolling Machine produces strong, accurate threads of excellent finish by the chipless, cold-forming process using four different Rolling Methods—Thrufeed, Infeed, Continuous, and Reciprocal. It will thread all diameters from $\frac{3}{16}$ " to 3", producing left- and right-hand threads of all types (except square), including UNC, UNF, Acme, worm, and many special forms.

Additional information on request—please send specifications and ask for Bulletin E-60.



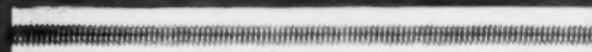
WORKPIECE: Jack Screw
MATERIAL: C1018 Steel
THREAD SPECIFICATIONS: 1"-5 pitch
 29" Acme
TOLERANCE: Class 4C
METHOD: Thread Rolling
PRODUCTION: 30" per minute (rolled
 in 36" lengths—can be rolled in 12"
 lengths)



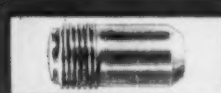
WORKPIECE: Double-End Stud
MATERIAL: C1040 and SAE 8620 Steel
THREAD SPECIFICATIONS: 2"-4 1/2
 pitch NC—3" thread length
TOLERANCE: Class 3
METHOD: Infeed Rolling (manual
 loading)
PRODUCTION: 1 1/2 min. rolling time
 per piece (both ends)



WORKPIECE: Aircraft Bolt
MATERIAL: 4340 Steel of 36-40 Rock-
 well C
THREAD SPECIFICATIONS: 1"-14
 pitch NF—1-5/16" thread length
TOLERANCE: Class 3A (Military Spec.
 MIL-B-7838-A)
METHOD: Infeed Rolling (manual
 loading)
PRODUCTION: 10 pieces per minute



WORKPIECE: Timer Switch Leadscrew
MATERIAL: B1112 and C1117 Steel
THREAD SPECIFICATIONS: 1/4"-16 Pitch Stand-
 ard Acme
TOLERANCE: Class 3G
METHOD: Thread Rolling
PRODUCTION: 46" per minute (rolled in 18"
 lengths—can be rolled in 12" lengths)



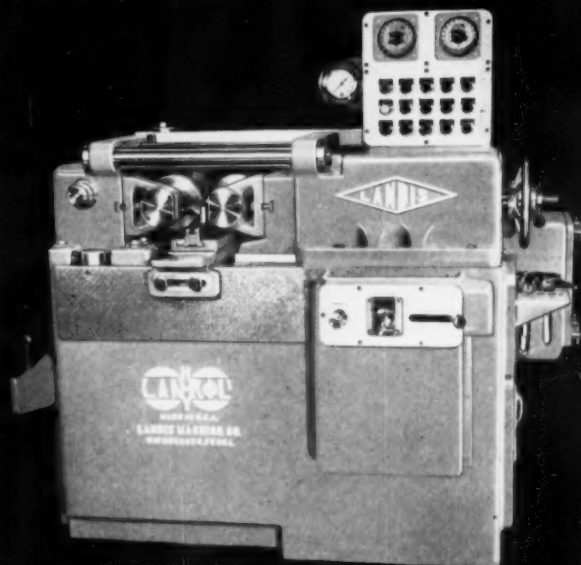
**WORKPIECE: Barrel—MG Gun Per-
 forator**
MATERIAL: A3 Carb. Silicon Tool Stl.
THREAD SPECIFICATIONS: 1 1/8"-6 pitch Stub-
 Acme—1" thread length
TOLERANCE: Class 3G
METHOD: Infeed Rolling (hand-operated work-
 holding fixture)
PRODUCTION: 15 pieces per minute



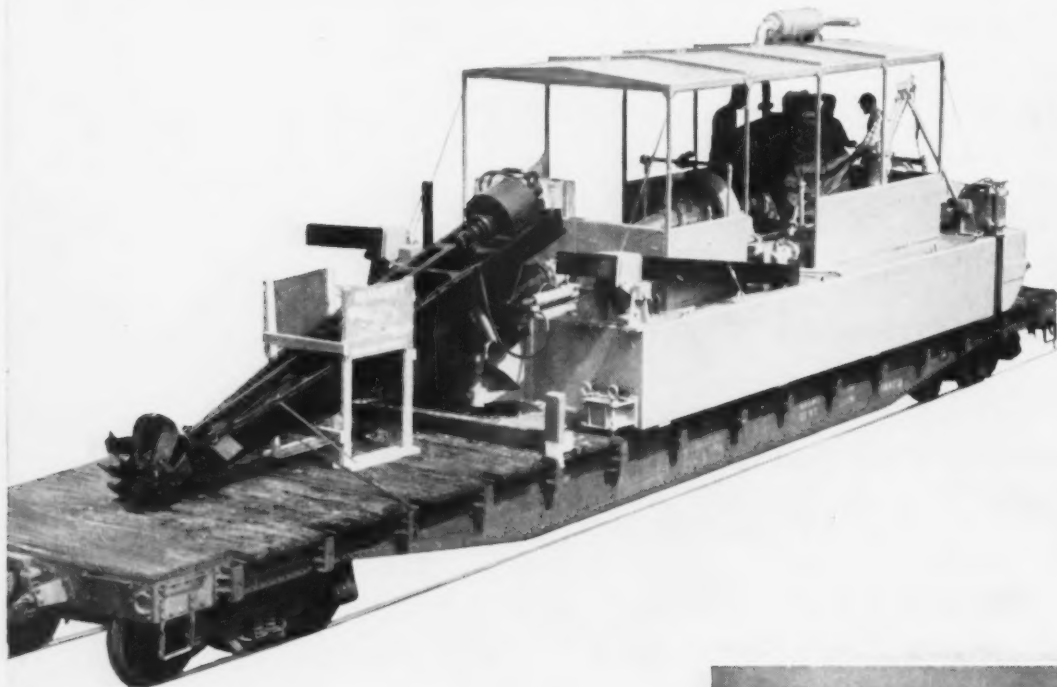
WORKPIECE: Transfer Drive Worm
MATERIAL: Stainless Steel
THREAD SPECIFICATIONS: 1/4"-26 diametral
 pitch, left hand, single—1 1/4" thread length
TOLERANCE: 1825—1805 P.D.
METHOD: Infeed Rolling (manual loading)
PRODUCTION: 20 pieces per minute

LANDIS
Machine
COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.



An Ellicott "Dragon" Dredge, constructed in part with Standard Steel Works forgings, ready for rail and freighter shipment to Hong Kong.



"To maintain our position of world leadership we must have superior service from our suppliers"

As suppliers of countless forgings to the Ellicott Machine Corporation for 30 years, we at Standard Steel Works feel we have been an integral part of the growth of Ellicott and in helping this world's largest dredge manufacturing company maintain its top position through all those years. We appreciate the fact that Mr. Mund and his associates realize it is not only by meeting design and steel analysis requirements for Ellicott, but also by consistently combining our know-how in steel fabrication with personalized attention to each order, that we have maintained our mutually satisfactory relationship. Every order we receive we accept as a service opportunity.

It is routine at Standard Steel Works to analyze all orders carefully and to present its requirements and possible problems on a personal, conference basis to the appropriate men in the shop; then to keep the customer continually advised on the progress of his order through our shops by means of frequent, periodic job-status reports. Our customers, whether they manufacture equipment for local use or for shipment to the far corners of the world, know that they can count on Standard Steel Works to deliver the right forgings at the right time—to help them maintain delivery schedules. Write or call Dept. 1B today and give us the opportunity to show you how our personalized service can prove invaluable in your operations.



"We are justly proud of our position as the world's largest designers and manufacturers of hydraulic dredges. Standard Steel Works is one of our suppliers which—in giving us that extra plus, superior service, while meeting our requirements for various forgings—have helped us maintain our world-wide leadership," says Allan Mund, Vice President and General Manager, Ellicott Machine Corp., Baltimore, Md.

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Auxiliary Mill and Processing Equipment, Presses and other heavy machinery.
Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

U.S.I. CHEMICAL NEWS

A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries

Greenleaf to Handle Market Development of Zirconium And Titanium for U.S.I.



William C. Greenleaf has been named Manager of Metals Development for U.S.I. and will be responsible for market development and sales of zirconium and titanium sponge, to be produced from U.S.I.'s two new plants now being built in Ashtabula, Ohio.

A recognized authority in the field of zirconium and titanium, Mr. Greenleaf presented three papers during the 1955 Atomic Industrial Forum Zirconium Program, describing (1) melting of zirconium, (2) fabrication of zirconium, and (3) zirconium mill products and prices. He also conceived and developed processes now in general use for producing both wide-sheet and flat-bar titanium and zirconium by continuous strip-mill techniques.

Faye Named Manager of Sodium Product Sales

Martin Faye has been named Manager of Sodium Product Sales for U.S.I. and will be responsible for coordinating sales and sales promotional activities for metallic sodium, "U.S.I. Isosebacic" acid and related products.

Mr. Faye joined the U.S.I.-National Distillers organization in 1952 in the Market Research and Development Department.



TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing the Editor, U.S.I. Chemical News.

A zirconium-copper alloy now available is reported to combine high electrical conductivity with good strength retention at elevated temperatures. Suggested for electrical motor commutators serving above 500°F where strength is needed. Conductivity is 95.8% of copper. **No. 1193**

Titanium wire cloth is now on the market in sizes from 60 mesh to coarser grades. It is reported to be particularly suitable for filtering or screening highly corrosive materials. **No. 1197**

Zirconium and Titanium Lick Roughest Corrosion Problems

**Metals to be Available at Lower Cost in Future;
Provide Long-Lived Materials of Construction;
Complement Each Other on Corrosion Resistance**

It is now practical to fabricate equipment which is *corrosion-resistant to almost every substance encountered in industry*, by using either zirconium or titanium metal. Alloys of either metal, or possibly both, may extend the range even further.

Industrial applications of these metals have been hampered by two considerations: availability and price. Zirconium will shortly be produced at a rate sufficient to supply industrial needs, and titanium has been available to industry during the past two years. And it is expected that increased production of these metals during the next few years will result in significant price decreases.

Twelve to thirteen thousand tons of titanium were available in 1956 and present construction schedules indicate that the figure will rise substantially in 1957. U.S.I.'s new plant alone will add 5,000 tons to the annual production capacity by the end of the year.

Zirconium will be on the market in quantity by mid-1957. When its new plant at Ashtabula, Ohio gets under way, U.S.I. will be able to supply 500,000 pounds or more per year to commercial users in addition to its Atomic Energy Commission commitments of 1,000,000 pounds per year.

New Metals Economical

Chemical process equipment can now be fabricated from titanium for a little over twice the price of stainless steel, and it is expected that in the future titanium equipment will be only 50-75% higher than stainless. Commercial grade zirconium equipment will probably be priced only 75-100% higher than stainless when volume production is reached.

Typical Corrosion Resistances* of Zirconium and Titanium

Corrosive Media	Metal Resistance	
	Zirconium	Titanium
Sulfuric Acid	excellent to good below 80%	good below 5%
Nitric Acid	excellent	excellent
Hydrochloric Acid	excellent	good below 10%
Phosphoric Acid	excellent to fair below 85%	poor
Chromic Acid	excellent	excellent to good
Aqua Regia	poor	excellent
Wet Chlorine Gas	poor	excellent
Chlorine Water	excellent	excellent
Sodium Hydroxide	good below 90%	good below 50%
Ferric Chloride	poor	excellent
Calcium Chloride	excellent	excellent
Cupric Chloride	poor	excellent
Sodium Chloride	excellent	excellent
Ammonium Chloride	excellent	excellent
Aluminum Chloride	excellent	excellent to fair

*Above data do not cover all conditions because of space limitations. Literature references may be obtained by writing the Editor, U.S.I. Chemical News, 99 Park Ave., N. Y. 16, N. Y.



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Division of National Distillers Products Corporation

99 Park Avenue, New York 16, N. Y.

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The very high strength of USS "T-1" Steel has helped Athey Products Corporation, Chicago, Illinois, to solve the problem of providing a high-volume trailer for hauling lightweight materials such as bauxite ore. This new rear-dump trailer is bigger than conventional units, yet...

WEIGHS 3½ TONS LESS

The very high yield strength of USS "T-1" Steel—90,000 psi minimum—enabled Athey to increase working stresses and reduce the thickness and weight of drawbar and draft frame structure and of all load-containing body plates. As a result, this unit weighs just 26,000 pounds—7,000 pounds less than conventional units—and, consequently, it...

TRAVELS FASTER

It can make empty trips much faster... can negotiate steep grades in one higher transmission speed than conventional units. Even with a full load of 35 tons, this lightweight unit can climb 14% grades in second gear. By reducing weight, USS "T-1" Steel speeds operations, cuts non-productive time, and makes possible a larger trailer that...

CARRIES MORE PAYLOAD

This trailer has the lowest ratio of vehicle weight to load weight ever designed... and carries a full 30.5 cu. yds.—8 yards more than conventional units of the same weight-carrying capacity. It promises to increase, materially, the efficiency of hauling lightweight materials...

THANKS TO
USS "T" CONSTRUCTIONAL
ALLOY STEEL

USS "T-1" Steel's toughness and resistance to impact abuse assure Athey the ruggedness and durability needed in off-road mountain service. Its excellent weldability kept fabrication simple.

USS "T-1" Steel can help you in a wide variety of heavy-duty applications. Get complete facts—call our nearest sales office, or write to: United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



See **The United States Steel Hour**. It's a full-hour TV program presented every other week by United States Steel. Consult your newspaper for time and station.



UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

**"It's a hydrogen-annealed
with a 30-micro-inch finish,"**



mass spectrometer magnet...

says **Albert J. Gross**, *U. S. Steel Machinist, Homestead Forgings Division*



We must admit that there was some doubt that these sections in the picture could ever be made to the specifications required by Argonne National Laboratory. They are yoke members and pole pieces for a 100-inch double-focus, mass spectrometer.

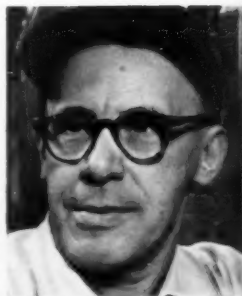
One of the primary requirements of the magnet was that it be made from as pure a steel as was commercially obtainable. Also, it had to be produced in one heat to minimize variation in behavior of the magnet.

The heat-treating problems were enormous and would have stumped any organization without the facilities and background of USSteel. The annealing, which was performed in a hydrogen atmosphere, developed a uniform, large grain structure for optimum magnetic characteristics. Unusual techniques were used, and a special steel jig was constructed so that the large pieces could be annealed without warpage.

Machining problems are best described by Al Gross who has worked as a USS Machinist for 34 years, 20 of them in the Forgings Division. In his words, "The specs for machining tolerances, surface finish and flatness were so exacting that at first there was doubt that it could be done. The wide plates, which are actually in three pieces, have a 50-micro-inch finish. The narrow pole pieces had to be parallel and flat within plus or minus .001". The ends had to be within .002" of a true square, and the surfaces were polished to a 30-micro-inch finish."

We don't receive orders for spectrometer parts very often. But even so, this job shows that a wide range of facilities are available when you specify a USS Quality Forging. From the melt shop, through the forging, heat-treating, machining and inspection departments, you can be sure of equipment of the best type, operated by men of the highest skill.

Please direct your inquiries for forgings to our nearest District Office and your request for our free 32-page booklet on forgings to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



USS QUALITY FORGINGS

heavy machinery parts . . carbon, alloy, stainless

forged steel rolls and back-up roll sleeves

electrical and water wheel shafts

specialty forgings of all types



UNITED STATES STEEL

NOTHING *can* *equal Stainless Steel*

in its unique combination of properties

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength, hardness, beauty, cleanability and easy fabrication. For a reliable source of supply, United States Steel offers you the widest range of types, finishes and sizes.

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NATIONAL TUBE DIVISION, PITTSBURGH
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WAREHOUSE DISTRIBUTORS
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USS STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS



UNITED STATES STEEL

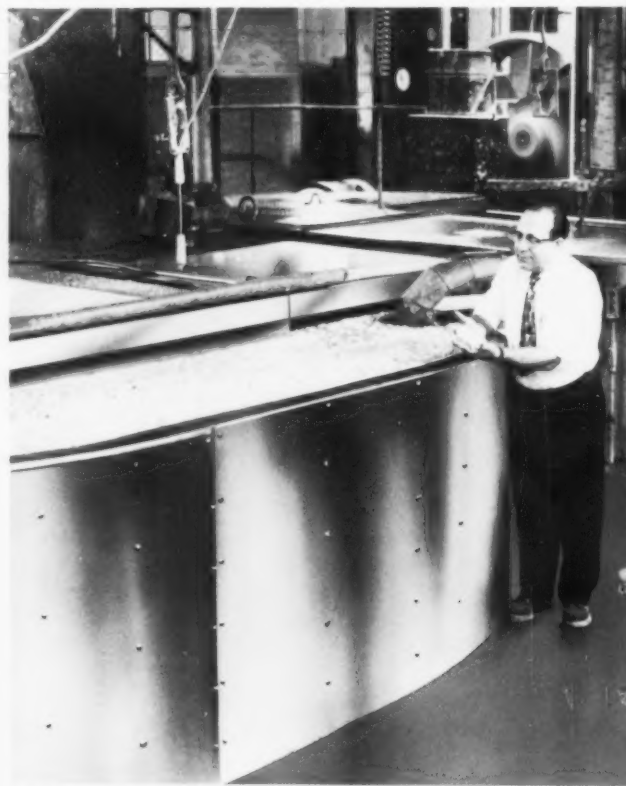
For Corrosion Resistance

This petrochemical extract fractionator was originally made from carbon steel . . . but corrosion ate through the plates and put it out of service in just two months. They lined the tower with type 316 Stainless Steel. When examined, the tower had been in service 21 months, and the Stainless was still in good condition.



For Sanitation

Food juices are incredibly corrosive, so some restaurants have a lot of trouble in their cold storage rooms because the racks corrode and harbor bacteria. Eastern Steel Rack Company makes racks from Stainless Steel. They are easy to keep clean; and, for all practical purposes, they *never* wear out.



For Cleanliness

Hawthorne Paper Company, Kalamazoo, Mich., goes to extraordinary lengths to guard against color room contamination. Old wooden tanks were thrown out and replaced with Stainless Steel. According to the men at Hawthorne, the Stainless has absolutely no contaminating effect, and it's easy to fabricate.

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YOUR NEW
ACTUATOR and SPLINE
"PROBLEM SOLVER"!



New 1957 Engineering
Data Book from World's
Largest Producers of
Ball/Bearing
Screws and Splines

36 pages crammed with time-, work-, and money-saving facts: Principles • Types • Basic Operations • Coupling Methods • Efficiency • Versatility • Advantages • Selection Factors • Design Data • Sample Problems, etc.



SAGINAW b/b SCREWS are 90%-98% efficient (compared to 15%-20% efficiency of Acme screws). Require $\frac{2}{3}$ LESS torque and power for same linear output—with consequent weight, space reductions. Function normally at -75° to $+250^{\circ}$ F. Two types: precision-ground or commercial rolled-thread. Have been built $1\frac{1}{2}$ in. to $39\frac{1}{2}$ ft. long.

SAGINAW b/b SPLINES have 40 times lower coefficient of friction than sliding splines; transmit or restrain high torque loads far better; permit vital power, weight, space reductions. Have been designed 3 in. to 10 ft. long.

Saginaw
ball/bearing
Screws & Splines

SAGINAW STEERING GEAR DIV., GENERAL MOTORS CORP., SAGINAW, MICH.

February 28, 1957

SEND FOR YOUR FREE COPY TODAY-----

Saginaw Steering Gear Division, General Motors Corp.
 b/b Screw and Spline Operation
 Dept. 6X, Saginaw, Michigan

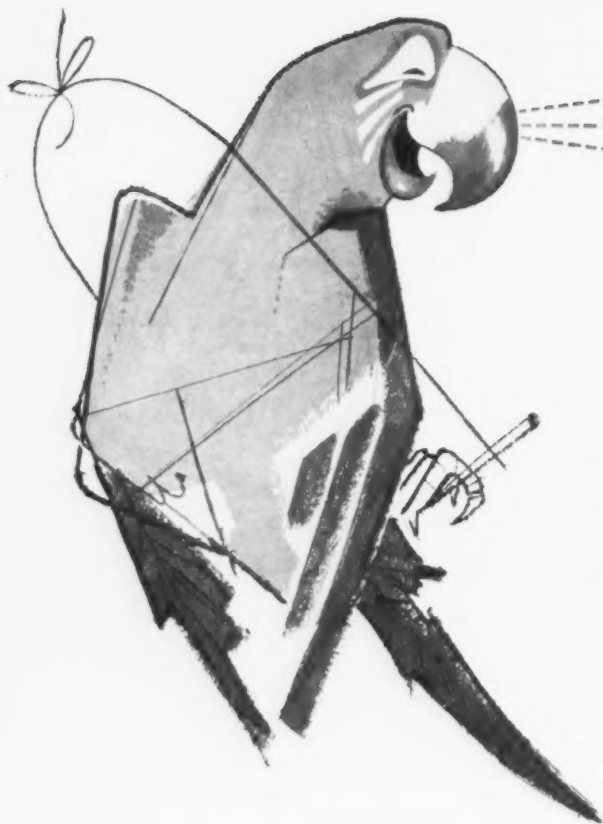
Please send 1957 engineering data book on Saginaw b/b Screws and Splines to:

NAME

COMPANY TITLE

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First cost is only one factor in the operating economy of high-heat-resistant castings. Extra service life, obtained through the *right* combination of physical properties and casting techniques, is a much sounder gauge of over-all economy.

That's why more and more heat-treat operators are specifying Thermalloy Radiant Tubes, Retorts, Trays, Pots and other heat-treat parts. We'd be glad to show you service life case histories to *prove* their long-life economy. Contact your nearby Electro-Alloys representative, or write for the technical bulletins listed below . . . Electro-Alloys Division, 8012 Taylor Street, Elyria, Ohio.

*Reg. U. S. Pat. Off.



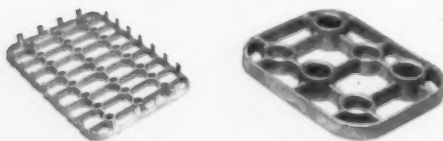
Thermalloy Radiant Tubes

Centrifugally cast to insure uniform wall thickness; pressure tested to assure freedom from leakage; X-ray controlled to guarantee soundness. Write for Centrifugal Casting Bulletin T-283.



Thermalloy Retorts

Octagonal, pit-type, annealing and spiral retorts—plus baskets and spiders. Special designs and grades of Thermalloy to meet your specifications. Write for Bulletin T-239.



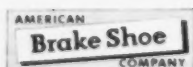
Thermalloy Trays

Experienced design know-how and casting techniques, plus Thermalloy's outstanding physical properties, mean extra service life and economy. Write for Bulletin T-227.

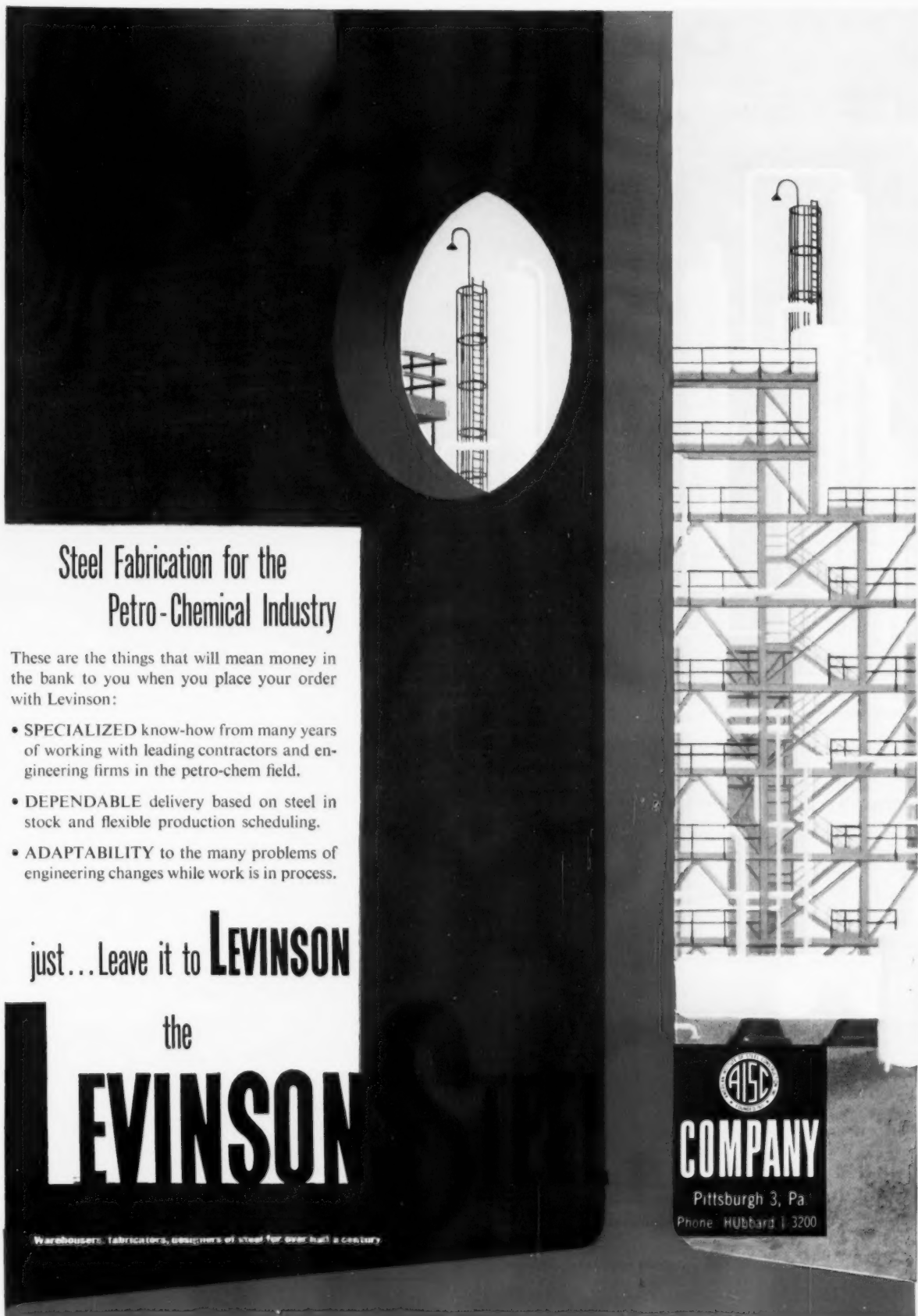


Thermalloy Heat-Treat Pots

A wide range of standard sizes, or "specials" to meet your needs—all cast of long-lasting Thermalloy heat-resistant alloys. X-ray inspected, pressure tested. Write for Bulletin T-234.



ELECTRO-ALLOYS DIVISION Elyria, Ohio



Steel Fabrication for the Petro-Chemical Industry

These are the things that will mean money in the bank to you when you place your order with Levinson:

- **SPECIALIZED** know-how from many years of working with leading contractors and engineering firms in the petro-chem field.
- **DEPENDABLE** delivery based on steel in stock and flexible production scheduling.
- **ADAPTABILITY** to the many problems of engineering changes while work is in process.

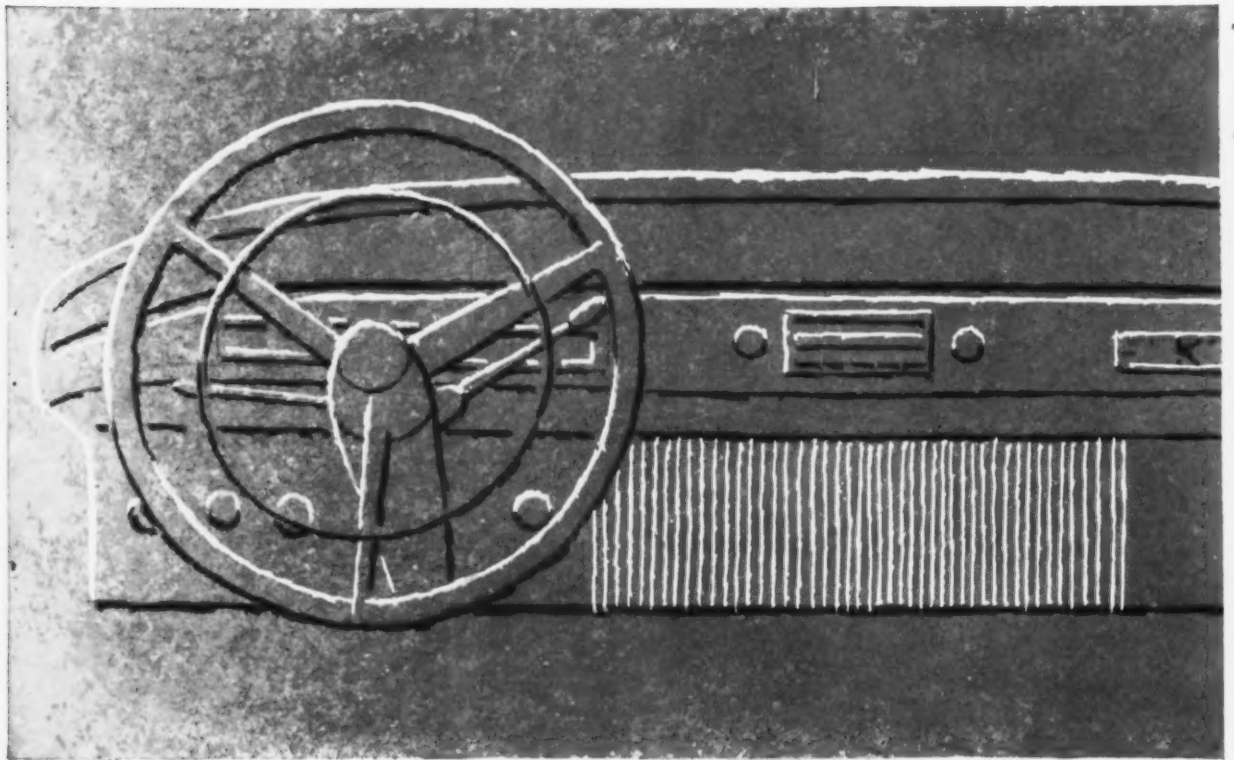
just... Leave it to **LEVINSON**
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Warehouses, fabricators, designers of steel for over half a century


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DECORATION



UNITED STATES



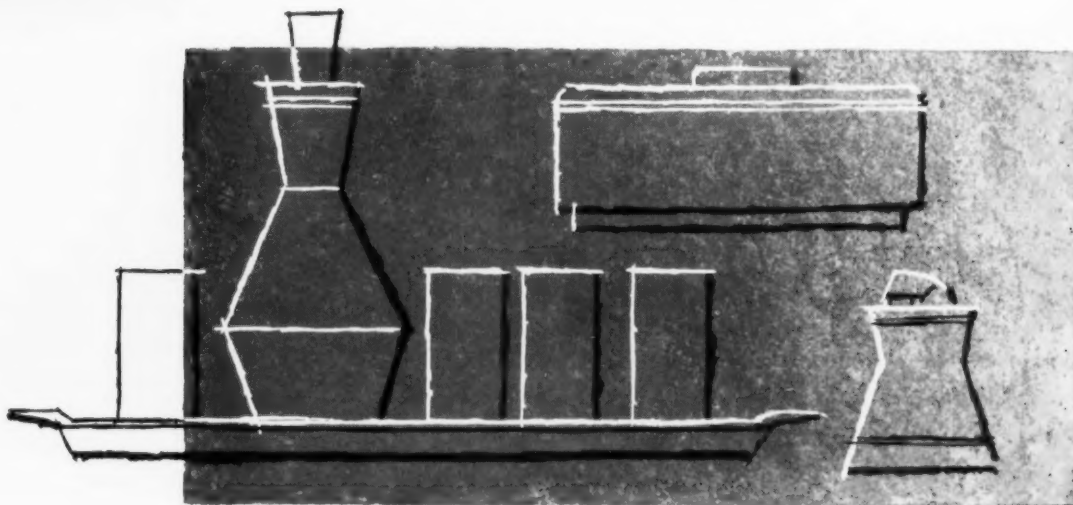
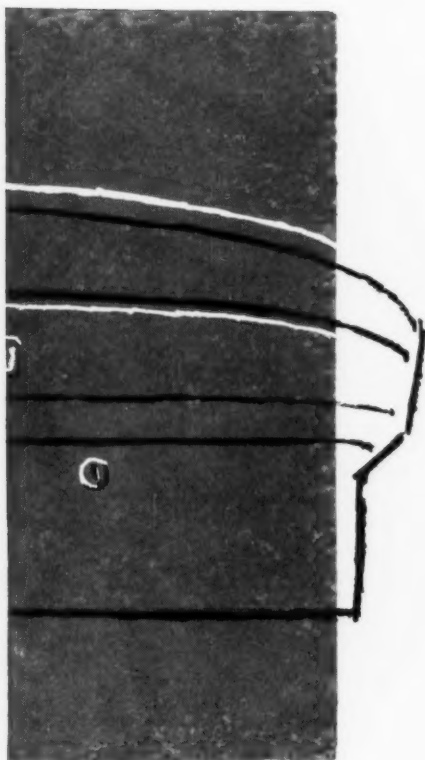
that can't fall off, rub off,
or chip off!

EMBOSSSED STRIP STEEL

Embossed strip steel—with the pattern built right in the steel—is an exciting and salable way to decorate products of steel. It is a way to add durable texture to an automobile dashboard, distinctive pattern and design to an automatic toaster. It is a way to add permanent charm and character to hinges, escutcheons, or other hardware items.

It is the low-cost way to dress up a product, because you don't have to apply the pattern. It is right in the raw material, put in at the steel mill. And put in to stay.

Tailored to your product! Amerstrip steel—either embossed or plain—is always tailored to a specific use. You get the exact shape, finish, ductility and other characteristics that you need. As a result—you can often build a better product, more economically, by making it from Amerstrip.

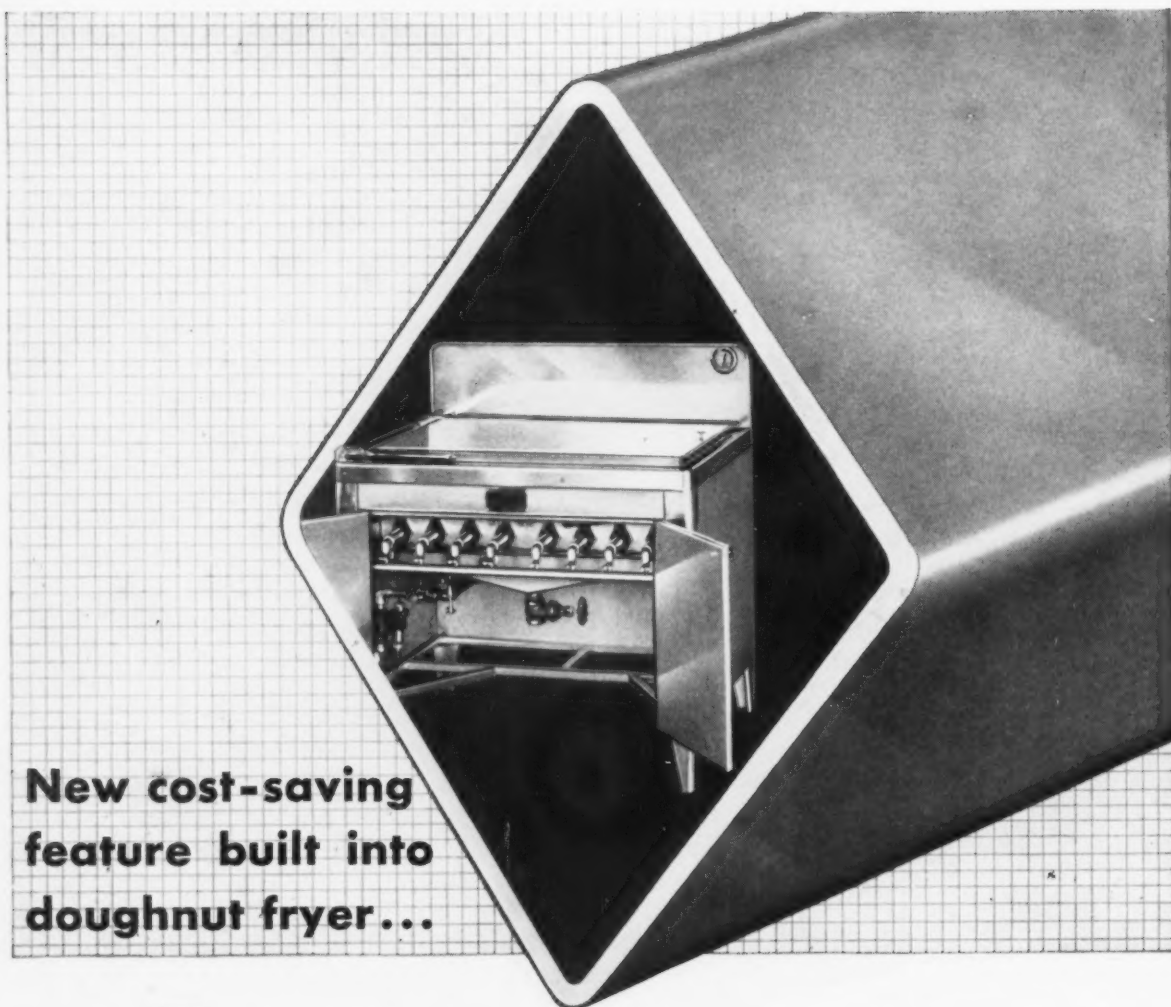


Call any sales office of American Steel & Wire for more information about the availability and uses of Amerstrip in carbon, alloy, or stainless grades.

S T E E L

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GENERAL OFFICES: CLEVELAND, OHIO • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERSTRIP



**New cost-saving
feature built into
doughnut fryer...**

with *Carpenter* Diamond-Shaped Stainless Tubing

• A new feature in this volume doughnut fryer is the use of super sanitary heating tubes made from diamond-shaped Carpenter Stainless Tubing. The diamond shape permits faster, more economical heating because of the greater heating surface in contact with the fat. Doughnut crumbs cannot settle on the tubes, making cleaning easier and preserving the fat longer.

This is just one more example of combining the inherent advantages of stainless—high strength-weight ratio, fine appearance, corrosion and abrasion resistance and super sanitation—with the extra benefits of special shapes of Carpenter Stainless Tubing. Why not investigate the possibilities of designing

and building the advantages of Carpenter Stainless Tubing shapes into your products. Call your nearest Carpenter Distributor or Branch Office for consultation and information.

MEMBER



**The Carpenter Steel Company,
Alloy Tube Division, Union, N. J.**

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"

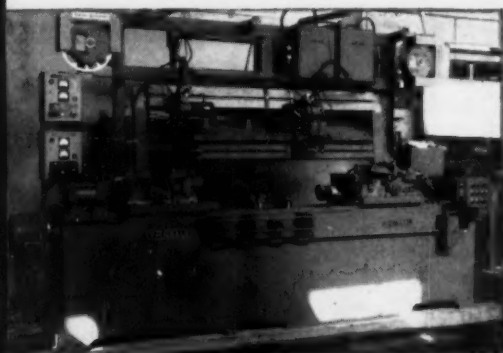
Carpenter

Stainless Tubing & Pipe

Accurate heavy cuts by this Cincinnati Rigid Shaper

... at NATIONAL
ELECTRIC WELDING
MACHINES CO.

Bay City, Michigan



The steel slide being machined will be used on a National Automatic MIG arc welder, such as shown above.

Economical production of this steel slide for an automatic arc welder requires heavy cutting with maintained accuracy. The machine chosen for this job is a 16" Cincinnati Heavy Duty Rigid Shaper. Some of the features which make this performance possible are:

- Extreme rigidity due to heavily ribbed column.
- Exclusive Cincinnati 50 PSI pressure lubrication.
- Maximum accuracy due to extended ram bearing and slot-free ram.
- Fast, easy operation due to electro-magnetic brake and clutch with finger-tip control.

Write **Department B** for Bulletin "CINCINNATI RIGID SHAPERS". We also suggest you consult our Application Engineering Department on your machining problems.

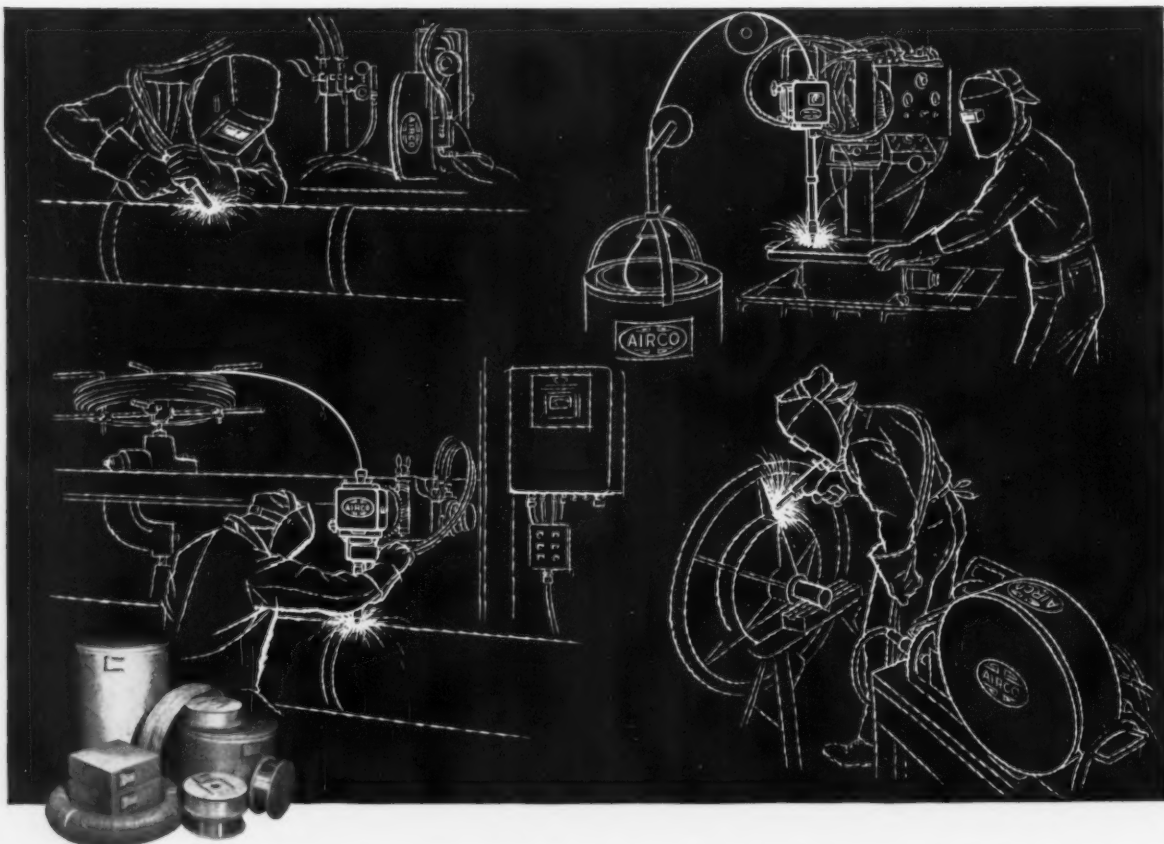
Photos courtesy National Electric Welding Machines Co., Bay City, Michigan.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES



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Aircomatic Aluminum Welding Wires. New Type A finish available for all high-quality work where X-ray standards must be maintained . . . scrupulously clean . . . bright finish . . . properly wound . . . smooth surface assures trouble-free feeding.

Aircomatic Stainless Steel Welding Wires . . . excellent

corrosion resistance . . . good tensile, ductility and impact properties . . . use to weld ordinary joints, apply stainless linings, build-up stainless overlays and join stainless overlays and join stainless clad materials.

Aircomatic Copper and Copper Base Alloy Welding Wires. Use to assemble copper bus bars . . . fabricate copper or bronze vats . . . build-up worn propellers, piston and valve parts . . . available in both solid and stranded types.

Aircomatic Steel Welding Wires. Three grades available for welding mild steel, armor plate and for overlays and welding hardenable steels.

Nickel base, magnesium, and titanium wires are supplied as specials. Consult your nearest Airco Office or Authorized Airco Dealer for complete information.

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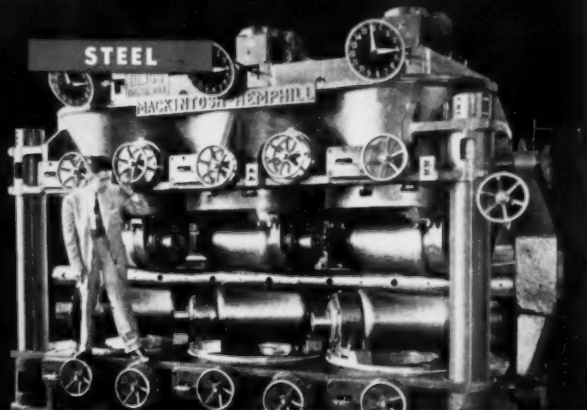
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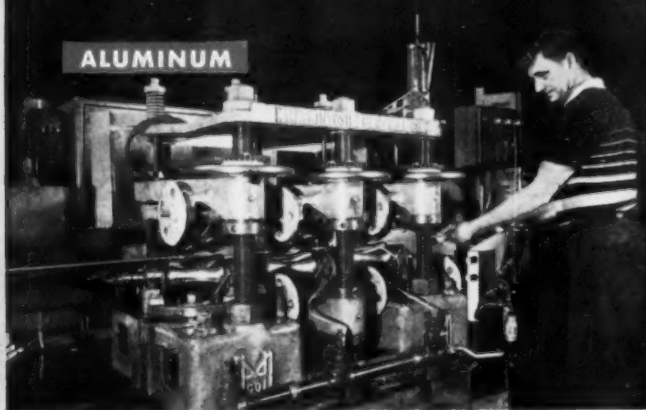
Products of the divisions of Air Reduction Company, Incorporated, include: AIRCO — industrial gases, welding and cutting equipment, and acetylenic chemicals • PURECO — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • COLTON — polyvinyl acetate, alcohols, and other synthetic resins.



STEEL

AT A LARGE STEEL PLANT...

This A-5 recently shipped to an eastern steel plant is the largest 6-roll straightener in the world; straightens electric-weld steel pipe in diameters between 4½" and 16", in 16-to-65 foot lengths at speeds up to 240 feet per minute. It illustrates the three-post design now available in large models of the Mack-Hemp straightener.



ALUMINUM

AT ALCOA...

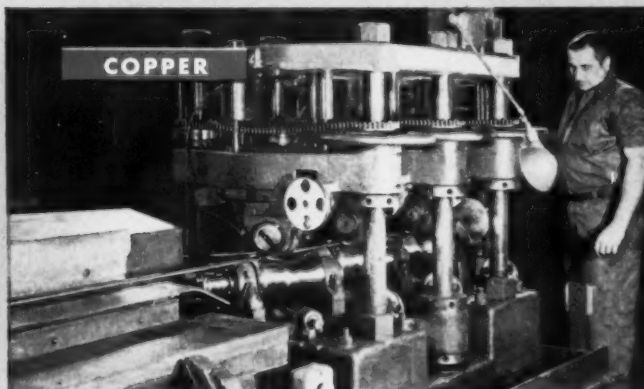
This Model AX has recently gone into operation at Alcoa's New Kensington, Pa., plant. It straightens from 100 to 150 tons of aluminum alloy tubing every month. Guideless design and power drive to all six rolls enable Mack-Hemp to successfully production-straighten easily-marked aluminum tube.



STAINLESS

AT BELL AIRCRAFT...

At this aircraft producer's Buffalo plant, this three-post Model AY straightens 3/16" O.D. 304 Stainless Steel tubing which Bell makes into rocket engine components. The machine raised Bell's straightening capacity from 570 feet to nearly 7500 feet per day... more than thirteen times as much!



COPPER

AT CHASE BRASS & COPPER...

This Model AN, with capacity of ½" to 3" O.D. is one of three Mack-Hemp straighteners at Chase's Cleveland plant. The Models AX, AY and AN together provide overlapping capacity for 3/16" up to 3" O.D., in straightening brass or copper tube and in "light tempering" annealed copper tube.

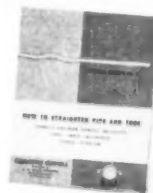
For premium tube straightness and roundness at high production speeds...

The MACK-HEMP Guideless Rotary Tube Straightener

- All six rolls driven—no guides—surface of straightened tubing is unmarked.
- Eliminates end bends and ovality; provides premium straightness and roundness over full length of tube.
- Rugged, heavy-duty construction.
- Models for all O.D.'s from 0.050" to 16" of ferrous and non-ferrous pipe and tube.

- Speeds up to 800 feet per minute.
- Easy to reset for different diameters—all models now available in three-post construction. Fast roll adjusting mechanism is enclosed and protected from scale and water.

ALL MODELS ARE NOW AVAILABLE IN MACK-HEMP'S EXCLUSIVE THREE-POST CONSTRUCTION



For complete details on Mack-Hemp Straighteners, write today for a free copy of our 24-page Technical Bulletin No. 55, "How to Straighten Pipe and Tube."



MACKINTOSH-HEMPHILL

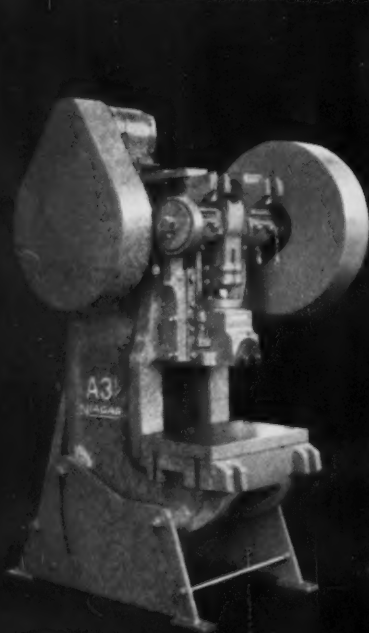
DIVISION OF E. W. BLISS COMPANY

Makers of the rolls with the Striped Red Wabblers

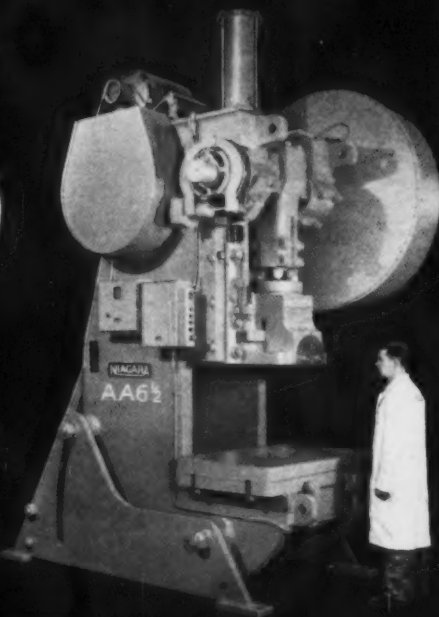
Pittsburgh and Midland, Pa.

CAST MILL ROLLS • JOHNSTON CINDER POTS • ROTARY TUBE STRAIGHTENERS • END-THRUST BEARINGS • HEAVY-DUTY LATHES • STEEL AND SPECIAL ALLOY CASTINGS

NIAGARA HAS THEM!



SERIES A, 5 1/2 - 110 tons

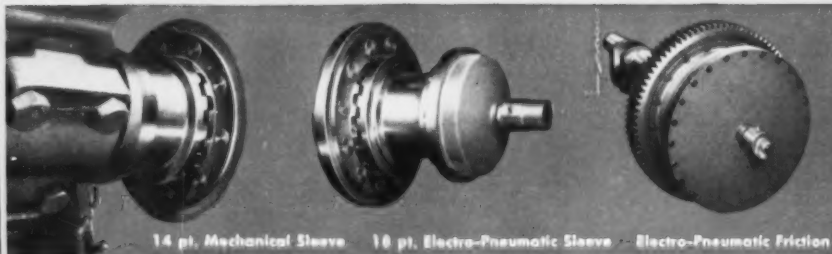


SERIES AA, 32-200 tons



SERIES E, 75-200 tons
Front-to-Back Crankshaft

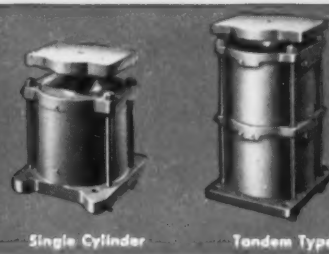
READILY EQUIPPED TO HANDLE



14 pt. Mechanical Sleeve 10 pt. Electro-Pneumatic Sleeve -- Electro-Pneumatic Friction

THREE TYPES OF CLUTCHES

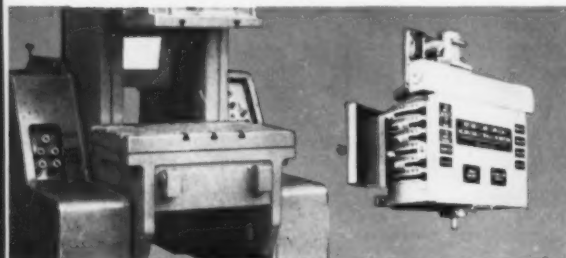
Each Niagara Inclinable features the clutch best suited for the purpose. (1) Famed Niagara multi-jaw mechanical sleeve clutch. (2) Exclusive Niagara multi-jaw Electro-Pneumatic sleeve clutch. (3) Niagara low inertia Electro-Pneumatic friction clutch.



Single Cylinder Tandem Type

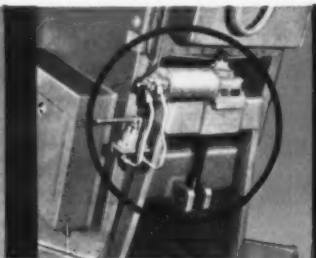
FOUR TYPES OF DIE CUSHIONS

Designed and manufactured by Niagara, single cylinder and tandem type pneumatic die cushions are built in 4 types to make any Niagara Inclinable a double action press. Self-lubricating models are available for automated OBI's.



EQUIPPED FOR AUTOMATION

Featuring the most advanced controls and devices, Series EA (automated models) are engineered for peak productive capacity. Here's a line of OBI's that is completely equipped by Niagara for operation in your automation lines.



POWER INCLINING DEVICE

Fast-acting, safe and easy to operate, Niagara's air motor inclining device (shown above) is furnished as an optional accessory.

SPECIAL BOLSTER PLATES
J.I.C. CONTROLS FLANGED SLIDES
POWER SLIDE ADJUSTMENT
FLYWHEEL BRAKE
DIE AREA LIGHTING
MOTOR CUTOUT SWITCH

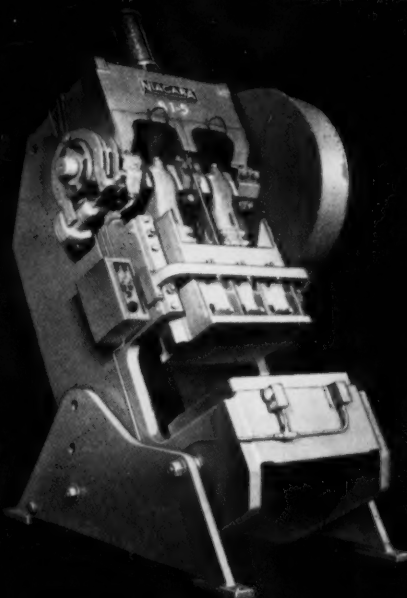
WIDE CHOICE OF ACCESSORIES

With a full selection of modern press accessories available, Niagara Standard Inclinables are adaptable to the widest possible range of job assignments.

standard OBI presses in all sizes and types that are right for you!



SERIES EA (Automated), 75-200 tons
Front-to-Back Crankshaft



SERIES BI, 60-200 tons
Double Crank

5 LINES . . . 34 MODELS
EACH A CHAMPION IN ITS CLASS:

Niagara offers you industry's most complete, most modern, and most exclusive selection of standard inclinables . . . plus an unequalled choice of press accessories and automatic devices to meet your specific job requirements. You can count on Niagara for inclinables that will do the most to speed production, assure accuracy, prolong die life and hold down maintenance costs within your plant.

YOUR WORK MOST PROFITABLY



Manual



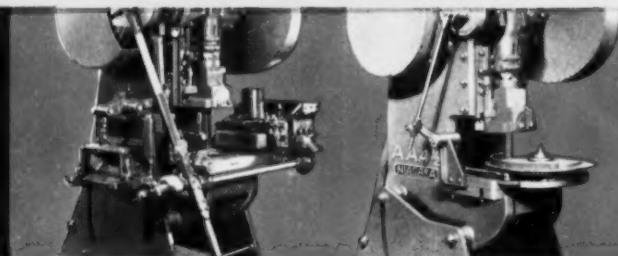
Automatic



Automatic Circulating

CENTRALIZED LUBRICATION TO FIT THE NEED

Niagara Inclinables are readily equipped with either manually-operated or automatic lubricators, or automatic circulating oil systems. It's one of the many ways in which Niagara outfits standard inclinables to meet individualized requirements.



ALL TYPES OF AUTOMATIC FEEDS

To speed production, Niagara Inclinables are easily equipped with complete, automatic feed arrangements: single roll, double roll, dial, chute, magazine and specially engineered types. Variable speed drives can be provided to allow adjustment for the optimum speed consistent with the die, material and feed length.



GET ALL OF THE FACTS on any or all Niagara Inclinable Presses. Consult with a Niagara representative. His recommendation will be impartial. He has all types of OBI's to offer. At your request, specific Bulletins on each series, containing complete information and specifications, will be mailed to you promptly

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America's most complete line of presses, press brakes, shears,
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Bit manufacturer bites off

George P. Gaunt (right) shop superintendent shows rock bit to Joseph D. Grigas, industrial lubrication specialist at Standard Oil. Joe recommended switch to SUPERLA Soluble Oil. Joe is well qualified to make such recommendations. He has 13 years experience in such work, has a degree in engineering from Illinois Institute of Technology and is a graduate of the Standard Oil Sales Engineering School.



Brunner & Lay carbide insert rock bits are made from high chrome—nickel—moly steel, Rockwell 18C-22C hardness.

20% production increase

SUPERLA Soluble Oil plus technical service add up to improved product output at Chicago Brunner & Lay Rok-Bit Corp.

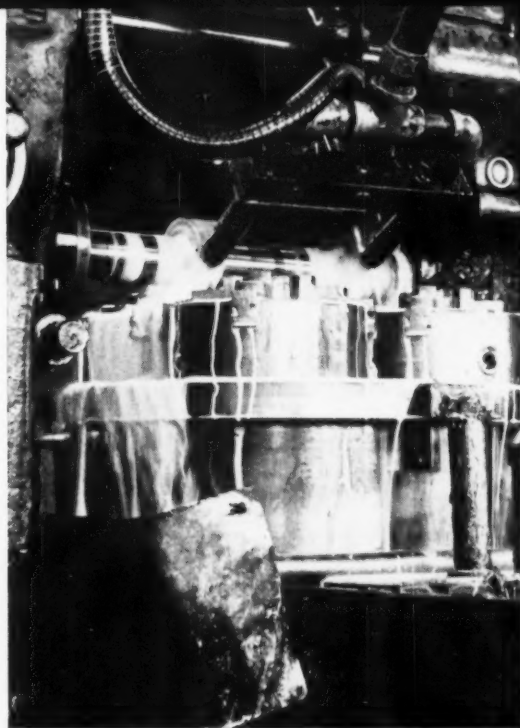
SUPERLA Soluble Oil, which is now being used by Chicago Brunner & Lay Rok-Bit Corp., has solved a lot of milling machine operating problems for the Company. Soluble oils formerly used separated out of emulsion and turned rancid in use. Oil circulating lines plugged repeatedly. The plant's production rate was not up to capacity because of frequent shut downs for cleaning of machines and for unplugging of oil lines.

On the advice of Joe Grigas, Standard Oil industrial lubrication specialist, the Company thoroughly cleaned the machines, then converted them to SUPERLA using the soluble oil at 10:1 dilution.

This is how the change-over worked out. *Production was increased 20%.* Machine down time was substantially reduced. The Company was sufficiently pleased with the performance of SUPERLA Soluble Oil in milling machines to convert two grinding machines to this oil. Results obtained on the grinding machines: excellent wheel life, good finish and rust protection of work and machines.

SUPERLA Soluble Oil emulsifies readily with all types of water. It is a stable oil and forms stable emulsions. It does not tend to develop objectionable odors in use nor is it injurious to men, work or machines. SUPERLA Soluble Oil gives good tool life and prevents rust.

Get the facts about SUPERLA Soluble Oil. Your Standard Oil industrial lubrication specialist has them. In any of the 15 Midwest or Rocky Mountain states, one of these lubrication specialists is nearby. Call the one nearest you. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.



Milled slots up to $\frac{7}{8}$ " wide and 1" deep are made in this special alloy Rok Bit Steel in one cut. All of these milling machines use SUPERLA Soluble Oil exclusively.

Quick facts about **SUPERLA Soluble Oil**

- Emulsifies readily
- Forms stable emulsion
- Doesn't turn rancid
- Economical. Requires low emulsion concentrations
- Prevents rusting
- Non-injurious to men, machines, work
- Gives good tool life



STANDARD OIL COMPANY (Indiana)



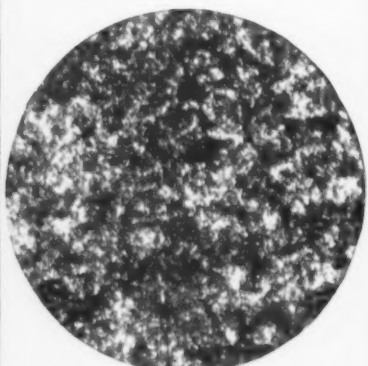
NOW...Republic Steel Lockers to preserve fine finish



FACTORY LOCKERS are sometimes subjected to rough treatment. Scratches are inevitable and fall prey to moisture when the steel is unprotected. Bonderizing solves this problem, helps protect handsome appearance. Republic's handy "space-saver" lockers (shown above) provide accommodations for two people in standard 15" width. Their fine finish will be preserved by Bonderizing.



Photomicrograph, 100 times enlarged, of a piece of plain sheet steel. The surface is glossy smooth with no porosity to give the finish a foothold.



Photomicrograph, 100 times enlarged, of Bonderized steel. The surface is crystalline phosphate. Enamel will penetrate microscopic pores, dry, and become securely anchored to the metal.

REPUBLIC



World's Widest Range of Standard Steels

are **BONDERIZED** and protect against rust

Bumps, scratches, moisture—whatever the punishment, a Republic Steel Locker can take it and still retain a glistening, handsome finish that will not chip, peel or flake off.

That's because the steel is now Bonderized to provide a superior base for anchoring the enamel finish to the steel surface and, at the same time, to guard against the spreading of under-finish corrosion which eventually causes peeling and flaking.

Republic Standard Steel Lockers offer three locking systems—are available in many types and sizes for every conceivable storage requirement.

One of the world's biggest locker manufacturers, Republic's Berger Division has behind it more than 65 years of locker-making know-how—plus thousands of successful installations. This is the kind of experience you can always depend on when you want the best in lockers.

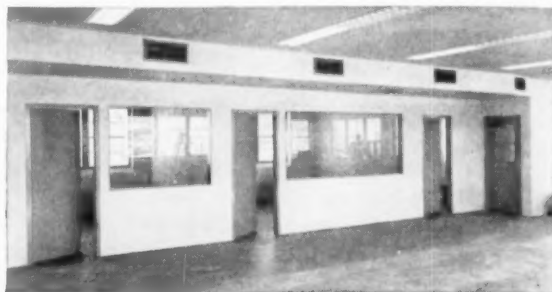
Berger offers business and industry a complete planning and installation service, too—from technical planning and engineering assistance to full responsibility for proper installation—right down to the final bolt. Get the facts from your Berger representative. Or mail coupon for illustrated booklet giving specifications and prices.

STEEL

and Steel Products



THE WORLD'S STRONGEST SHELVING is Republic Wedge-Lock, made by Berger. It actually gets stronger as weight increases; permits extremely high stacking where floor space is limited. This popular shelving is widely used throughout industry for the storage of bulky, heavy items. Berger's shelving experts will be glad to help you plan your shelving arrangement. Send coupon for facts.



BONDERIZED TRUSCON STEEL DOORS CAN BE PAINTED TO MATCH any color decor. They refuse to stick or bind because steel can't swell or warp. Perfect for factory offices. Truscon makes sound-deadened Interior Swing Doors and Sliding Doors that glide noiselessly on nylon rollers. Send coupon for literature.

REPUBLIC STEEL CORPORATION

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3104 East 45th Street
Cleveland 27, Ohio

Please send me information on:

- ☐ Republic Steel Lockers with new Bonderizing
- ☐ Republic Steel Shelving
- ☐ Truscon Steel Doors

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Machining Costs Cut 25%

by switch to NEW RYECUT 50

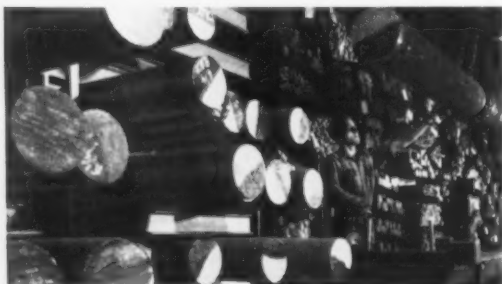


Logan Engineering Co. report shows how you
can save up to 30% with a Ryerson leaded alloy

THE PROBLEM—This Chicago manufacturer of precision lathes faced a tough production problem from a time and cost standpoint. Lathe spindles have to be tough and hard with high wear resistance—so the steel Logan originally used was SAE 52100.

But the spindles were turned down and center-drilled from the solid to hole sizes as large as $1\frac{3}{8}$ ". And ID's had to be accurate and free from scoring along the entire length of the spindles. 52100 provided the required mechanical properties but was slow cutting and created production difficulties and a high scrap rate.

Needed: A *free-machining* steel that would develop the high hardness levels, the toughness and wear strength required for the application.



THESE LARGE ALLOY STOCKS . . . also carbon and stainless steels in every shape and size, are in stock at Ryerson. Also call Ryerson for reinforcing steel service, industrial plastics, machinery and tools, etc.

THE SOLUTION—Logan engineers had long been on the lookout for a steel that would solve their production problems so they were eager to try New Rycut 50 when this Ryerson 50-carbon alloy steel with a controlled lead addition was suggested by Ryerson metallurgists.

New Rycut 50 was a success from the start! Now, after two years, Harry Peterson, Logan plant superintendent, reports: "New Rycut 50 has saved us a consistent 25% of our former costs in the production of lathe spindles. Rycut's uniform machining and hardening properties have reduced scrapped parts to a minimum and the steel has proved satisfactory in every way."

This is just one of many case histories in our files on the steels in the Rycut series—New Rycut 50, Rycut 40 and Rycut 20. Actual performance records show machinability increased as much as 50% . . . tool life lengthened as much as 300% when a Rycut steel is used in place of a standard alloy of comparable mechanical properties.

To get further information on these great new cost-cutting steels or for quick shipment of any steel requirement, call or write your nearby Ryerson plant.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI
CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

NEWSFRONT

What About Scrap Exports Ban?

The holdup on scrap export licenses shouldn't weaken the domestic market right away. For one thing, current licenses will keep shipments going for some time. Also, there's an unusually large tonnage of scrap on order by East Coast mills. And one mill's spokesman says that, despite reports of general market weakness, scrap shipments are coming in slowly. If the ban sticks, it will ease domestic market pressure.

Latest On CO₂ Mold-Curing

In line with mounting interest in CO₂ mold- and core-curing, a recent study indicates that the water glass used in the process must have low viscosity. Only 20 to 30 seconds of gassing is enough to provide maximum mold strength. Green strength, the study shows, can be improved by adding such organic binders as dextrine and water-soluble starch.

Keep An Eye On Auto Frames

Watch for some significant developments in automobile frames in 1958. In an effort to lower car silhouettes even further, at least one producer will switch to unit body construction. Others are considering going over to some form of the Cadillac body being used this year. Absence of side rails allows the body to sit lower on the frame of the car.

Tape Recorder: Industrial Relations Tool

A Midwestern steel company has put the tape recorder to work in industrial relations. The company makes a tape recording of arbitration meetings. Later it plays it back to management training groups. Twin objectives: To give management people a better feel of arbitration proceedings, plus some helpful checkpoints on how to avoid pitfalls.

In Production, Vacuum Diecastings

Vacuum diecasting of aluminum is now being done on a production basis in a cold-chamber machine. Castings are virtually as dense as forgings; offer mechanical properties much superior to conventionally diecast parts; can now be anodized easily. Combination of thin-walled, high-

strength diecastings that can be anodized as easily as sheet or extruded aluminum products, in bright colors or clear finishes, could open new fields for aluminum producers and for product design people.

Furnace Simulates Atomic Heat

Now building: A solar furnace capable of concentrating sun's rays to produce, within a 4-in. test area, temperatures equal to those of an atomic explosion. For Army Quartermaster Corps use, the furnace will permit laboratory testing of new materials for protecting Army personnel against atomic, other such weapons. Plans call for completion by early summer.

Cast Wheels Get AAR Nod

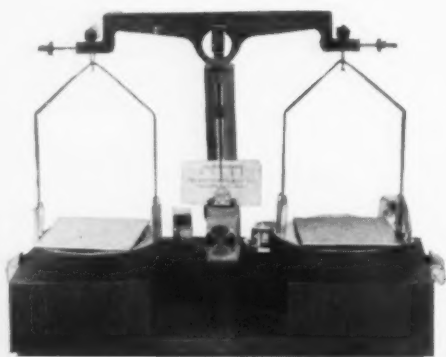
The Association of American Railroads has approved, as an AAR standard, use of one-wear cast steel wheels for freight car service. Decision follows several years extensive testing. Investigations showed that 0.75 pct C content cast wheels averaged nearly 89,000 miles in service; 1.50 C wheels, 141,000 miles. In freight car service, the wheels are reported to equal or surpass conventional wheel performance.

Presses Outstrip Tooling Production

High production capacity of Air Force heavy forging presses is keeping them well ahead of tool-and-die facilities. Full production runs are being completed on single-shift operation. Closed dies keep getting successively larger as know-how increases. Principal new die-making developments are in reducing draft in forgings.

Ionic Drive: Worth Looking Into?

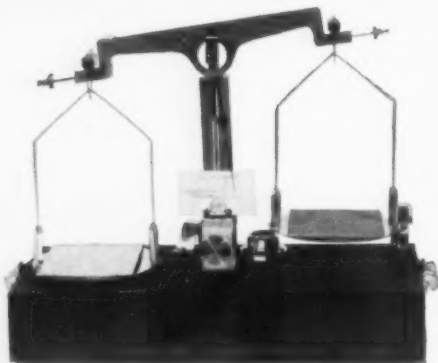
Air Force thinks streams of electrified particles (ions) may drive space ships in years ahead. There's no space ship yet, and there won't be for some years. But to prepare for day when a suitable power plant will be needed, Air Force is sponsoring studies of ionic drive theory anyway. Science now has ion streams at work creating very high temperatures for testing of various materials.



NO WEIGHT DIFFERENCE. Two identical panels of low-carbon sheet steel were used. They balanced the scale.



RODINE MINIMIZES ACID ATTACK. Each panel was placed in a beaker containing 10% by volume of 66° Bé sulfuric acid at 160° F. The acid in the right-hand beaker was uninhibited. The acid in the left-hand beaker was inhibited with Rodine 82, ¼% by volume of the concentrated acid. There was little or no hydrogen evolution in this beaker . . . Rodine retarded the attack of the acid on the base metal.



RODINE SAVES METAL. Both panels were removed from the acid pickle solutions after 5 minutes. The one pickled in the uninhibited acid had lost 1.4% of its original weight. The one pickled in the Rodine-inhibited acid had lost only 0.001%. This represents a saving of 26 lb. of steel for each ton pickled; and a simultaneous saving of nearly 50 lb. of 66° Bé sulfuric acid when Rodine is used to inhibit the acid.

ACP Rodine®

SAVES ACID, SAVES METAL—

GIVES YOU MORE

STEEL TO SELL

With ACP Rodine as the pickling acid inhibitor, you use less acid and have more steel to sell. Up to 50 lb. of acid is saved per ton of steel pickled and up to 26 lb. of steel. Fuming is practically eliminated. Formation of blisters and embrittlement is minimized. Costs of charging and cleaning of pickle baths are reduced—baths can be operated longer, and less acid is required to keep them at desired concentration. There are fewer rejects—steel pickled in acid inhibited with Rodine has uniformly clean, bright surfaces, free of pits, blisters and smut.

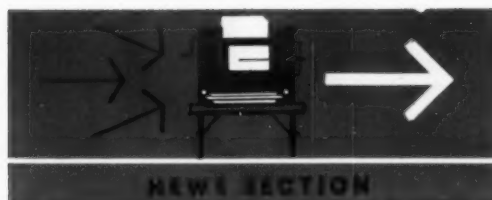


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New Chemical Horizons for Industry and Agriculture





Brace Yourself For The "New" McDonald

Lessons learned in election contest will toughen steel union leader . . . New attitude will be apparent in 1959 negotiations with steel companies . . . Tighter control within union seen—By Tom Campbell.



■ This is an analysis of the recent election for presidency of the United Steel Workers. Here editor-in-chief Tom Campbell looks beyond the vote counting where a comparatively unknown challenged David McDonald for the presidency of one of the nation's biggest and most powerful unions. What he sees is based on 21 years of labor reporting—and on his talks with those in and out of the union.

McDonald: The Victory Was Hard To Take

◆ DAVE McDONALD'S reelection as president of the Steelworkers' union came as no surprise. But the strong showing of a comparatively unknown opponent lifted some eyebrows in the industry. Chances are the challenger, Don C. Rarick, rode to glory on the pocketbook issue. Some union members were rankled by the \$2 a month dues increase voted at last year's convention.

The big surprise is yet to come. Its impact will be felt along about June 1959 when steel labor contracts are reopened. Those steel company negotiators who have missed the implications of the recent steel labor election will be able then to trace its pattern.

There is a "new" McDonald as the result of the election and what went on during the campaign. Dave is far more democratic than the late Phil Murray. He seldom

cracks the whip. His reluctance to stir up a big deal during the campaigning and his "apparent" nonchalance at Mr. Rarick's barbs were subtle moves. Let's say he will still be democratic but not overly so.

Look Out Below!

Some of the things that happened were predicted to Dave by those unappointed advisers who talk turkey to him now and then. They knew long ago that things should have been tightened up; that more direct action should have been taken. A few have gone so far as to suggest that Dave ought to pick some of his associates with a little more care.

These admonitions are not necessarily on the "must" list but it is certain that Mr. McDonald will follow paths similar to those suggested. It may not show on the

surface now but it will be quite visible when he opens up on the steel industry in June 1959.

It may be best to dispose of some of the fallacies being bootied about concerning a fellow who hopes one day to be top dog in the union movement. You hear that steel workers don't like Dave because he is too handsome. That's for the birds. As long as Dave gets them the long green stuff without too much lost time, he is their boy—even if he looked like Liberace.

What About Molony?

Take the argument that Dave is a softie. Don't believe it. That was proven last year when he outwitted and outsmarted some steel people and a few Administration stalwarts.

How about Joe Molony who was supposed to be Dave's contender

SPECIAL REPORT

for the throne? This fellow lined himself up with Mr. McDonald against Don Rarick. That was because Molony is smart. When—or if—Joe goes for the big seat he will be much surer of his chances than he is right now. Or it may be that he has made his decision to ride the McDonald train.

There is an old wife's tale that Dave hurt himself by hobnobbing too much with steel company brass. That doesn't make sense. Most steel workers lead as sound and as fulfilling a life as any of the bosses with whom Dave traveled.

Now let's have a look at the "new" McDonald. He isn't going to assume any more that things don't need looking after. He is going to be on the job. He is already more realistic.

Last summer's bout with steel negotiators hardened Dave's attitude towards them. The election

results will cause this hardness to run a little deeper. He now knows that the steel worker may love you today and toss you out tomorrow—unless you drive the best bargain you can; and always better than the last one.

Mr. McDonald will still run the union as a democratic organization but he won't be foolhardy about this. He has learned what the late Heywood Broun meant when he said "an open mind is nothing but a draft." This awareness of the need for a tighter organization from top to bottom will please some of those who felt that often things were left too much to chance and to good fellowship.

A lot of people in the USWA will now prove their loyalty by deeds rather than by words. This doesn't mean the steel union will try to adopt some of the teamsters' tactics. But it does mean that there will be less guessing on what the score is.

For the next four years Dave McDonald will be at it night and day proving to himself and to others that he is as good as Phil

Murray was; as good as John L. Lewis is and better than Walter Reuther. He has some powerful allies. They are not all in the union although he has a lot of supporters there.

Dave McDonald is welcome at the White House when he wants to see the President. He has the respect of the Secretary of Labor and of the Secretary of the Treasury. These two men were as much in his corner last year as they were in steel management's corner. The only thing that bothers them is that John Q. Public has no voice when the "big fellows"—labor and management—get together.

What has all this to do with the election which Dave McDonald won fairly easily? You could say that the challenge of Mr. Rarick and some rank and filers was a catalytic agent bringing into focus many odds and ends which had been floating around Dave's doorstep.

A La Roosevelt

That much was clear if you analyze Dave's "campaigning." It is there that he did a neat double of the late President Roosevelt's defense inspection "trips" throughout the country. Dave made quite a few trips to the hinterlands where he gave forth with a state of the union speech. It was probably one of the most solid jobs of diplomacy and subtlety in his career. It is a rough measure of his probable performance in the future.

The Steelworkers' union has no intention of foregoing a rip-roaring drive for more money, less work and better fringe when the present contract is reopened. Mr. McDonald is still a young man. To get reelected again in four years he has to "produce." It is too early yet to know or guess very well what his specific demands will be.

The only thing that would stop the steam rolling of wage inflation is a full blown depression. No one in labor is afraid of a recession any more. Nor does the thought of one—or the experience of one—tend to produce smaller demands or none at all. Dave McDonald intends to fight all the

Labor-Management Schedule for 1957

INDUSTRY-WIDE BARGAINING SCHEDULED

Oil: Agreements of Oil, Chemical and Atomic Workers expire.

Rubber: Agreements of Rubber Workers with major companies expire.

Telephone: Most agreements come up for renegotiation.

SOME BARGAINING SCHEDULED

Aircraft: Most agreements run until 1958, with no wage reopenings. Lockheed in Georgia and Cessna are up this year.

Glass: Agreements of Glass Workers with big producers are

closed until 1958. Some major agreements of Glass Bottle Blowers and Flint Glass Workers expire this year.

Railroads: Nonoperating unions closed until 1959. Operating unions negotiate this year.

Shipbuilding: Pacific Coast yards agreements run until June. East and Gulf Coast agreements run through 1957.

NO BARGAINING SCHEDULED

Autos: Closed until mid-1958.

Steel: Closed until 1959.

Farm Equipment: Closed until 1958.

way, all the time and for the best that he can get—if not without a strike, then with one.

Consumer Veto?

The chances are about 60-40 that we will have a long steel strike in 1959. And when it is over the futility of bucking powerful unions when inflation still rules, when labor shortages still exist and when defense still takes the biggest part of our money will be apparent.

But the industry will make a fight—a stiffer one than last year. The outcome: you name it; but be sure you concede that the cost will be as big if not bigger than last year's three-year contract; and just as hard to take. Unless: the government forces upon labor and industry a "third" member of the big deal—the consumer, with a right to vote. The blueprints haven't been detailed yet but the boys are working on them in Washington.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept. THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Law for Emergency

The U. S. Senate is talking about a possible emergency plan to head off serious strikes such as that recently pulled by the East Coast longshoremen.

Under a proposal backed by Sen. Ives, R., N. Y., the President would be empowered to proclaim a "national emergency" as a means of preventing a threatened major strike for a period of 60 days.

Following this, the President would appoint an emergency fact-finding board to investigate and make recommendations.

In the event the strike or lock-out should continue unsettled for 60 days, the President then would be required to send the emergency board's recommendations — plus his own—to the Congress.

The way the Taft-Hartley law reads now, emergency boards make no recommendations. Their reports are made only to the President.

LABOR

WAGES: Up 7¢ In Cleveland

Associated Industries report twenty-one contracts signed this year average 7¢ wage boost . . . 4294 workers are affected . . . More long term agreements.

◆ THE ANNUAL labor-management hassle over the bargaining table is off to a flying start in Cleveland. Twenty-one contracts have been signed so far this year granting an average raise of 7¢ per hr, not including fringe benefits, to 4294 workers.

Associated Industries of Cleveland, authoritative management group, says raises so far this year are somewhat lower than last year, which averaged 9.76¢ per hr up to March 1, among 16 companies.

Issue Proving Ground

Of this year's early contracts, four gave increases of 5 and 6¢ each, while three more gave 7¢. One company with 50 employees gave no increase, and two went as high as 10¢. Largest single contract was for a 6¢ increase covering 1383 workers. Weighted average increase of all companies was 7¢. Eliminating the company which gave no increase would raise the average boost to 7.1¢.

This year is expected to be the proving ground for major issues in 1958, according to AIC. These include the shorter work week, pension plan improvements, more holidays and longer vacations.

More long-term contracts are also expected this year. These are beneficial to management in an intensely competitive period, and to labor in consolidating its position.

Automatic Increases

Of 306 labor-management contracts in Cleveland last year 160, or more than half, were for two years. Ninety-five were one year agreements; two were for 18 months; 43 were for three years; five were for five years; and one was for five and one-half. Of multi-year contracts, 181 provided for wage increases.

Is This The Wage Pattern For '57?

(21 settlements in Cleveland area since Jan. 1)

Increase per hour	No. of Companies	No. of Employees
0	1	50
3	1	150
5	4	534
6	4	1383
7	3	350
8	2	91
8.5	1	975
9.2	1	511
9.5	2	128
10	2	122

Weighted Average Increase
All Companies: 7¢

One major factor affecting Cleveland wage figures this year will be automatic increases of 6¢ per hr for 50,000 workers. These are covered in either direct automotive contracts or patterned after them.

Probe Aircraft Profit

Builders of military airplane engines and armament are telling Congress about their costs and profits.

A House Armed Services subcommittee, with Rep. Hebert, D., La., as chairman, wants the details. The group is using public hearings and questionnaires to get the data.

Chairman Hebert also has plans to check into airframe subcontracts, substitution of concrete for flexible pavement on airstrips, and complaints of lags in completing defense orders. He will ask about the Defense Dept. program of materials standardization.

BLAIRSVILLE: Research With A Profit

Westinghouse facility is a pilot plant for new metals . . . But it also produces alloys for commercial use . . . List of new developments is long . . . Operation prospers because it fills a need.



SPECIAL PROJECTS such as forging these turbine blades, among the largest in the world, are dovetailed at Westinghouse's Blairsville facility with regular production of special alloys and other metal products.

◆ **RAPID GROWTH** of the Blairsville metals plant of Westinghouse Electric Corp. points up two big facts:

There is a growing need for facilities to develop and produce new metals.

A combination of development and manufacturing under one roof represents problems, but it can be made to work.

The Blairsville facility is primarily a pilot plant. Its main function is development—bringing new metals from the laboratory to the commercial stage. A second job is the production of alloys and castings for commercial use.

For both, it is equipped with all

essential elements of a modern metal fabricating plant. All the furnaces and machines are big enough to handle realistic production quantities.

Since its opening a little more than a year ago, Blairsville has moved forward in a hurry. Employment has jumped from around 200 to 600. New furnaces and rolling mills are being added.

Important Advances

In this period Blairsville has devised new techniques for annealing stainless steel U-tubes to be used in reactors for submarines. It has found ways to forge large special alloy turbine blades. Projects have involved casting

consumable electrodes, rolling nuclear elements and testing equipment.

The plant has turned out a steady supply of wrought alloy and precision castings. It has come up with rush replacement parts.

Blairsville's speedy acceptance as an integral part of Westinghouse raises the question: Why aren't there more of its type?

The answer lies in costs. Westinghouse put better than \$6 million into Blairsville initially. Equipment includes two big induction melting furnaces and a vacuum furnace, an 18,000-lb forging hammer, hot and cold-rolling mills and other major facilities.

New equipment includes a 4-stand bar mill and an arc melting vacuum furnace.

Production Too

Under the stop-and-go conditions of development work, the cost of such a plant would be backbreaking. To help pay the bill and keep operations in working trim, Blairsville runs production jobs on standby equipment. The plant makes and sells wrought alloys and precision castings.

In addition, Blairsville takes on development projects for outsiders. The Atomic Energy Commission has been one to take advantage of this service.

The money making operations have come along nicely, but the company sticks to its original intention of keeping Blairsville primarily a development facility.

To keep development projects from being crowded out by commercial work, an equipment reserve is always maintained. Machines are never booked beyond capacity for pilot steel production work. And this capacity allows time for development work.

EXECUTIVES: Rank Has Its Privileges

Companies realize it takes more than straight salary to hold a top executive . . . Retirement, insurance, other benefits are extended to management . . . Expense accounts, club memberships grow.

♦ **FRINGE BENEFITS** for the executive? With a topflight executive rated, in value to his company, at anywhere from 12 times his annual salary to one flat estimate of \$250,000—employers argue that it takes as many fringes to hold a good executive as it does a good welder.

Dartnell Corp., of Chicago, has analyzed 2000 companies, asked them what makes an executive happy and how is he kept that way. Here's what's happening on the executive-labor front!

Retirement: The age at which a good executive leaves his desk for the last time is moving up. Generally, the age limit is somewhere between 65 and 70. Better than 1000 companies of the Dartnell sample retire their man completely. A growing number (17 pct of the sample) retain him in a consultant capacity.

Retirement pay is on the increase. Company retirement funds plus Social Security guarantee incomes up to 50-75 pct of prior earnings (figuring tax deductions) at least, in a 141-company sample. The same 141-company sample six years ago reported only 40 pct retirement pay.

Insurance: This is the most common benefit, the most rapidly growing, the most popular. Nearly all firms sampled now pay all of the premiums on a policy on the executive or at least a major share. Two-thirds of them bear the entire cost.

Small business firms, which couldn't take advantage of group policy savings, now pool their insurance needs through their trade associations. The common policy value per executive is one year's income, with some firms exceeding this by a handsome margin. The

firm that does not offer its prospective executives Blue Cross and Blue Shield is competing with a majority of firms that do. Many now offer their executives supplemental benefits over and above conventional hospitalization policies and share or bear entirely the cost of both.

Sick leave: About half of U. S. firms, if the sample is accurate, have no fixed policy with regard to executive illness. Among the remainder, a strong sample of large firms offer him 4-5 months sick leave at full pay and further time at partial pay. Another system is based on one week or one month for each year of service.

Company health programs: Only about one-quarter of the sample have a formal physical checkup program, but these are generous and increasingly common. The small firm employing less than 250 persons spends \$675 per year for examinations of executive personnel. For firms with over 5000 employees, the expenditure skyrockets to \$7500.

Company cars: Most of the 2000-firm sample gives the executive use of a company car and half of these businesses underwrite all of his costs in connection with it. For those who do not, mileage allowance is a source of complaint. Some haven't changed in 20 years. An eight cents per mile figure is gaining ground.

Vacations: While popular with the younger executive set, they are sometimes turned down by older hands who feel they can't take the time. Company feeling is that a vacation is compulsory as a Social Security deduction. The three-week vacation is growing in favor, and at least 25 pct of firms

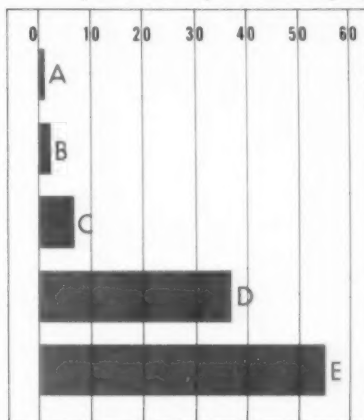
allow three weeks after first year.

Club and association membership: The average firm pays \$2430 per year for social club membership fees for its top management, and \$2490 for professional association memberships.

The executive contract: An executive may have a contract with his employer and not know it. Courts recognize a stock purchase plan based on a stipulated period of service as a form of contract.

How Companies Handle Executive Expenses

(Pct of Companies Surveyed)



A—Increased Salary to Cover Expenses

B—Direct Payment Only

C—Flat Expense Allowance

D—Reimbursement and Direct Payment

E—Reimbursement

Titanium: Still High But Coming Down					Dollars Per Lb.
	SHEETS	STRIP	PLATE	BILLETS	WIRE
Jan., 1957 To Date	11.60 ✓	11.00 ✓	9.25 ✓	6.85 ✓	8.50 ✓
June, 1956—Jan., 1957	12.60	12.10	10.00	7.25	9.00
Dec., 1955—June, 1956	13.10	13.10	10.50	7.90	9.50
April, 1955—Dec., 1955	14.00	14.00	11.50	8.50	10.50
Dec., 1954—April, 1955	15.00	15.00	12.00	9.00	11.00

TITANIUM: Are Prices Coming In Reach?

Cost cutting projects open up new markets . . . Producers are doubling production to meet aircraft market . . . Use of titanium scrap is a big factor in bringing costs down—By G. J. McManus.

♦ TITANIUM producers have two big market pushes going. They are busy with cost cutting projects that promise to open up important commercial markets. They are doubling production to take advantage of the growing aircraft market.

Recent cost cutting moves include:

Installation by Rem-Cru Titanium, Inc., of a 2000-lb pilot furnace that will take titanium scrap in forms now unusable.

Development by Mallory-Sharon Titanium Corp. of a process for electrolytic refining of titanium scrap.

Equipping by Titanium Metals Corp. of America of the first "specialized and exclusive facility for rolling and forging titanium."

It's a Trend

The TMCA project is part of the growing trend in titanium production toward independent, complete facilities. In the early days of

titanium making, producers shuttled ingots around for rolling on steel mills. This added to costs, presented quality problems.

There is still a dependence on stainless mills, but titanium is emerging as a separate field with its own facilities. A big step in this direction came last October when Titanium Metals bought a steel mill in Toronto, O., and began installing equipment designed strictly for titanium processing.

The new scrap projects are important for several reasons. For one thing about half the titanium that starts as an ingot winds up as scrap by the time final rolling is completed. Much of this is in the form of heavy crops. It is not economical to chop these up into small chips, which is necessary for use in conventional titanium furnaces. For this reason, crops are discarded or sold at a low price.

The Rem-Cru pilot furnace is designed to take large pieces of

titanium. Few details are available on the furnace but it is believed Rem-Cru is melting its charge in one piece—without the progressive buildup of conventional furnaces. The crucible is lined with a titanium layer or "skull" but this is reused for successive heats.

In addition to permitting greater use of scrap, this method would make it possible to cast titanium. Also it should reduce the alloy segregation problems that are present when an ingot is built up in layers.

Extract Pure Titanium

Mallory-Sharon's scrap activity parallels work by the Bureau of Mines and others in the electrolytic refining of both scrap and titanium sponge. In a pilot plant that is due for completion by June, Mallory-Sharon will extract extremely pure titanium from scrap that may have a wide range of

contaminants. The process is expected to work with solid chunks as well as with shavings.

As it stands now, producers work only with pedigreed, segregated scrap. The cost of preparing scrap limits the amount used by producers and also the amount they will pay for it.

Current price of titanium scrap is \$1 per pound, which is roughly one-twelfth the selling price of titanium products. This unfavorable ratio increases the cost of using the material. More economical scrap processing and fuller scrap use would trim the spread at both ends. It would reduce the price of titanium; it would give the user a higher return value.

Sponge Price Drops

A third area where costs will probably drop is materials. Price of titanium sponge is down from \$5.00 a pound to a current figure of \$2.75. There is talk now that new processes or improvements in the Kroll process will eventually bring the sponge price down to \$1 a pound.

At present the price of titanium is about 17 times that of stainless steel on a basis of weight. By volume or area, the ratio is about 8 to 1. Titanium producers feel that even with today's prices, their metal will pay for itself in many applications. They are making slow but steady progress in chemical, marine, process, paper mill

and other applications where corrosion resistance is important.

In the military field, titanium began to take off in 1956. Shipments (mostly military) of 5000 tons more than doubled that of the previous year. This year, shipments will again double, reaching somewhere between 10,000 and 12,000 tons. All major producers are expanding rapidly.

Expansion timetables jibe fairly well with rising requirements but don't give producers too much breathing space. Last December titanium began to get tight and the Air Force stepped in to oversee distribution. This had been done in a general way before that but in December the Air Force got into detailed scheduling.

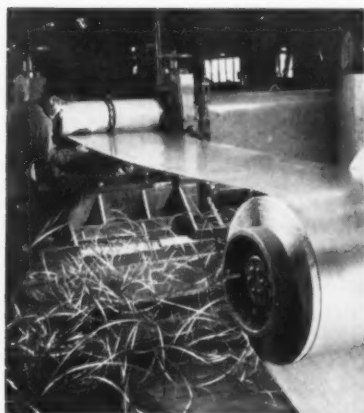
The sudden lift in titanium shipments has come largely from jet engines. About 70 pct of titanium going to aircraft is for engines. Twenty-five percent goes into airframes.

In airframes, titanium is being used in hot skin and structural sections around the engines. It has been used for jet pods of larger planes, and for fire walls.

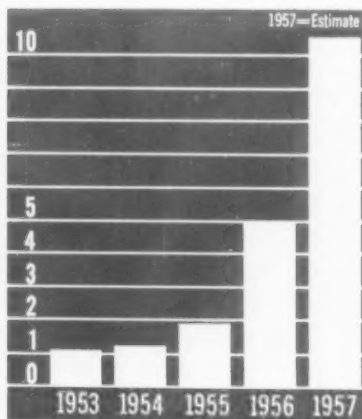
For the future, titanium men see their aircraft market holding up well. Titanium alloys now available have a temperature ceiling of 800 F. Alloys coming up are expected to crowd 1000 F. That's the limit as far as producers can see. They feel it assures them a place in aircraft for some time.

Titanium Gets Off The Ground

Shipments of Mill Products in Thousands of Tons



Titanium Metals Corp. Photo



Source: Dept. of Commerce

Scrap:

Exports will continue at high levels.

Indications are there will be no sharp curtailment of scrap exports in the foreseeable future. Pressure from the U. S. State Dept. against cutting off our allies appears strong. Quotas or embargoes are out.

The State Dept. attitude is expected to have strong effect on Dept. of Commerce officials who, in the next 30 days, will decide whether any new controls are needed over mounting exports.

At present, there are no restrictions on exports. Rules limiting scrap exports on a cargo-for-cargo basis (a new shipment for each one delivered) were dropped last September.

While the governmental soul-searching over scrap exports is underway, the Commerce Dept. is temporarily holding up processing of new applications for exports to the three major consuming foreign areas—Japan, Britain, and the European Coal and Steel Community.

Ask More Licenses

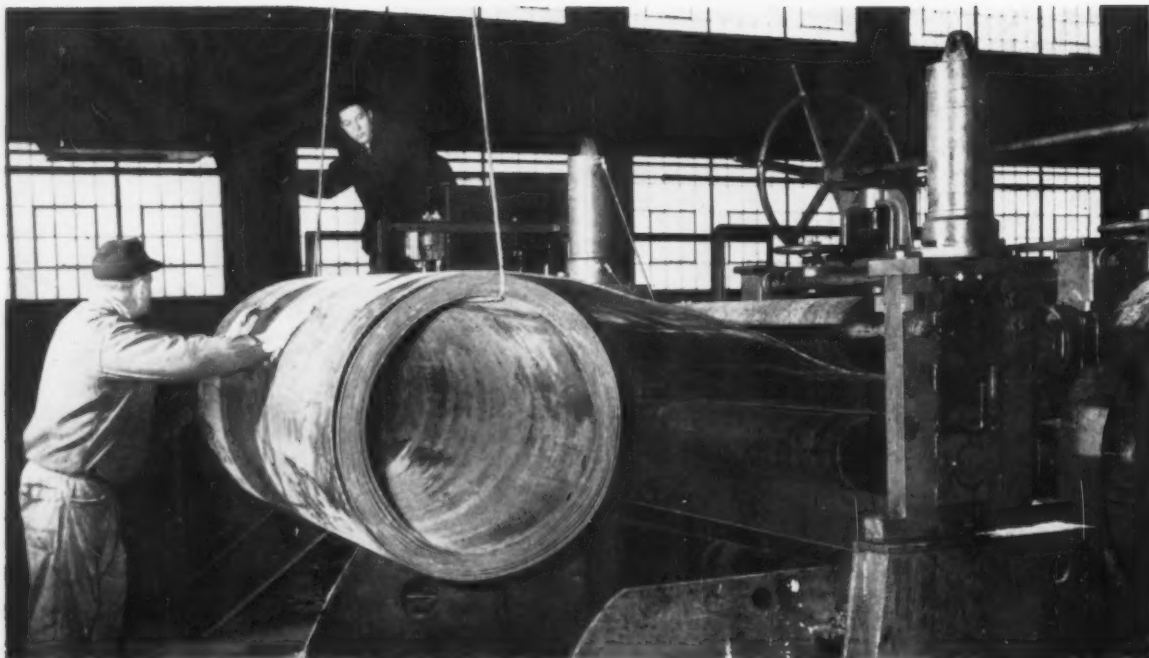
Demand for scrap export licenses rose sharply following completion, recently, of an independent research group report indicating over-demand for heavy melting.

One possibility is a qualitative limitation. This would restrict exports of heavy melting grades to a specified percentage of bundles and other grades.

Believed more likely, however, is a sort of "gentlemen's agreement" with the three major foreign buyers. Government officials cringe at this term, and generally deny that this method has been used.

The system is to ask representatives of these three areas what their minimum estimated needs will be during a year. Then they are asked to hold to an "agreed on" amount, with the threat of export controls implied if they go too far over the quota.

Talks have been held quietly with the steel industries and governments of all three buyers in recent weeks in which 1957 needs were discussed.



LIGHT PLATE: Demand has resulted in special lines such as this at Builders Structural Steel Co., Cleveland.

COILED PLATE: Loosens A Tight Market

Major producers take up slack in cold-rolled sheet schedules by running light plate in coiled form . . . Offers long-looked-for relief to light plate users . . . Shearless operation offsets other costs.

♦ **LOOSENESS** IN cold rolled sheet markets is proving a wind-fall for at least one type of steel customer—the light plate user.

Three major mills—Republic, Great Lakes and McLouth Steel—are turning out a total of about 15,000 tons per month of light coiled plate. A fourth, Jones & Laughlin in Pittsburgh, may enter the market soon.

Production of the plate up to about 5/16 in. has relieved a good deal of pressure on the light plate market and actually reversed it from a tight to relatively loose item in the Detroit-Cleveland-Pittsburgh area. Chicago is still tight and is being supplied from Cleveland and Detroit mills plus regular local plate mills.

Biggest users of the light plate are special tank builders such as those for chemical plants and refineries, railroad car builders, construction firms, steel fabricators and other types of builders.

For mill production men, at Republic, the heavyweight coils have been no picnic. They are probably the fastest cycled mill product in the mill, with about three hours elapsing between slab furnace and loading on gondola cars.

Coiling reels had to be slowed down to handle the plate and were the limiting factor on thickness. The coils had to be moved out of the mill quickly and were loaded hot, thus making truck impractical.

Ultimate costs average about \$12 per ton over the mill price to customers. Average fee for flattening and shearing varies between \$8 and \$10 per ton. Local switch charge adds \$1.70 to \$2. After licking the production problems, mills have found the product profitable because the coils are sold for the same price as sheared lengths but no shearing is done.

The sheet producers now turning out light plate were more or less pushed into it by a loosening of the cold rolled sheet market. Republic Steel offered tonnage of coils to 84 in. wide by 1/4 in. and 72 in. wide to 5/16 in. just prior to the steel strike last summer. Delivery dates were not firm. Some 30,000 tons were sold in

three days. This tonnage was not completely written off until late December. By then McLouth and Great Lakes were also in the market.

Steel producers don't really want the business and are not actively soliciting it. "As soon as the cold rolled sheet market picks up, we're going to restrict tonnage," L. S. Hamaker, Republic general sales manager, said. "We are making only limited tonnage available to a few customers and are not actively seeking orders." Officials at Great Lakes and McLouth Steel echo these feelings. But Jones and Laughlin is looking over the market with the possibility of entering it.

Tonnages Increase

One of the major drawbacks has been locating facilities for uncoiling, straightening and shearing the plate. Practically all tonnage in the Cleveland area went to Builders Structural Steel Corp., which has large roller levelling and shearing facilities.

A new line was recently completed at the shops there especially to handle this new business. Builders Corp. has processed about 10,000 tons in recent months and uses a percentage in its own structural and other fabricating work.

Another Cleveland fabricator, American Steel Suppliers, Inc., has processed heavy tonnages of the coiled plate from all three producers and in a few weeks will complete a new line to handle plate to 84 in. wide.

Auto Orders First

In the Detroit area Great Lakes Steel Co. and McLouth are turning out an average of almost 5000 tons per month and finding a ready market among local warehouse fabricators. M. L. Perry, assistant to the vice president at Great Lakes, said the firm started turning it out both because of weak demand for cold-rolled sheet for auto plants and downtime on some rolling mills because of expansion construction.

Most of the tonnage has stayed in the Detroit area but occasional shipments have gone to Toledo and Chicago.

TRANSPORTATION

STAINLESS: Try It For Taste

**Stainless may find new markets in food shipments . . .
Orange juice tanker may be forerunner of other tanker-type
liquid shippers . . . Quality up, costs down.**

◆ THE U.S.S. TROPICANA recently tied up to a New York dock and began unloading 650,000 gal. of orange juice. What possible interest could this have to metal-working?

The catch: The *Tropicana's* hull concealed stainless steel tanks, which make possible fresh-tasting orange juice after the sea voyage. Furthermore, it may be a forerunner of increased use of stainless in transporting liquids.

The ship was originally built as a general cargo ship. It has now been converted for duty as a juice carrier. Present capacity of 650,000 gal will soon be boosted to 1,450,000.

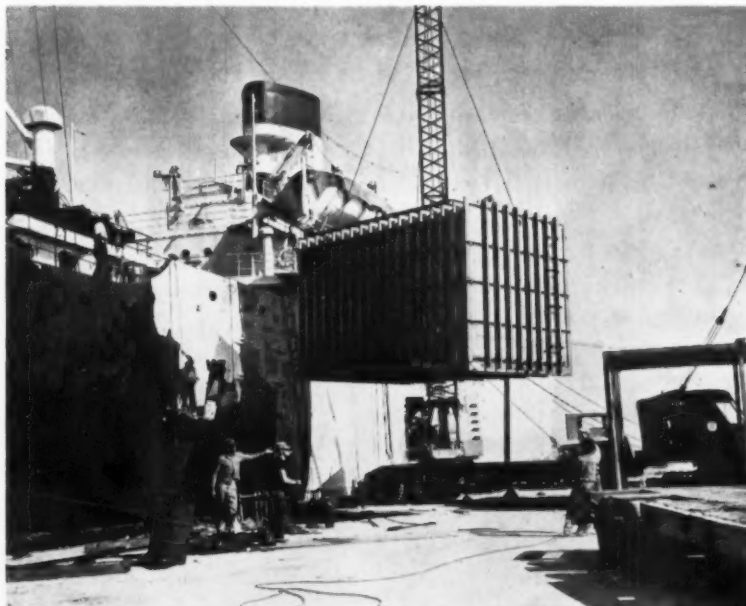
Juice is carried in stainless steel tanks varying from 30,000 to 90,000 gal. Tanks, fabricated in Flo-

rida, were hoisted into the ship in sections, then welded together. They are welded to the hold deck to permit expansion and retraction at different temperatures. A stainless steel pipe system allows each tank to be filled individually. Overall, the ship contains more than 250 tons of stainless.

More food than orange juice is scheduled to rate a sea cruise. Bethlehem Steel's shipyards are building a tanker to carry wine. Milkships are very much in the picture.

The *Tropicana's* tanks are insulated with foam glass to maintain a temperature of 28° to 30°F during the 56-hour run.

In addition to maintaining juice quality, the unique transportation provides significant freight savings for fruit industries.



THE ORANGE JUICE tanker is not something from a fairy tale, but a \$7 million venture by Fruit Industries Inc., to bring bulk orange juice in stainless steel tanks, by sea, to be cartoned and sold in New York.

BUDGET: Politics Outweighs Economy

Politicians will get to work on Ike's budget . . . But result is not likely to be cuts . . . If anything, appropriations will be increased by Congress . . . Defense budget will be a prime target.

♦ **PRACTICAL POLITICS** rules out any substantial cuts in President Eisenhower's thumping big budget.

When smoke from current congressional shouting in favor of paring the \$72 budget clears away, the total is more than likely to be up than down.

By the time the end of the coming fiscal year rolls around 16 months from now, total spending is apt to be up by a billion dollars or more.

Taxpayers Write

The increasing number of Joe Taxpayers now exercising their constitutional right to petition Congress are going to get plenty of promises. They won't get the reductions they ask for.

Politics is the answer. The current heavy flood of mail to Capitol Hill demanding reduced spending is the first such major outpouring from the populace in a decade. Most of the writers aren't specific as to what they want cut. The ones that are all want the digging to be done in somebody else's back yard.

Too many Congressmen got caught last time such a movement sprouted out of the grass roots. They took it at face value, and began to whack off an appropriation or two—some welfare programs, fish and recreation programs and the like. The howls they touched off have just now died down.

Budgets aren't often cut. Not in boom times, anyway.

Despite this, there's no shortage of budget-cutting talk around Congress. Various congressional leaders say they could knock from \$2 billion to \$5 billion off the budget request if given a chance.

The Administration tells them to go ahead. So do the letter writers from home. But by the time the trading's done and the politics figured, there won't be any toes stepped on.

Hit the Administration

Politics too will help force the budget upward. Next to granting tax cuts, the next popular political gimmick is to try to show ineptness in an administration. One of the best ways in these days is to try to prove "necessary" programs have been cut back too far. Defense is a good place to start.

Last year, the Democrats hung an extra \$900 million appropriation on the Pentagon for more jet bombers.

This year, too, there is a good chance there will be increases here and there by Congress. This will mean bigger government and thus more procurement of civilian items.

Defense Up

Defense spending will rise to new cold-war heights as the world tide ebbs and flows from crisis to crisis. It's easy for congressmen to make a case for more defense spending in these critical times.

Most congressmen already know what Treasury Secretary Humphrey and the rest of the Eisenhower Administration this year had to admit: In these times, government spending snowballs no matter how much you'd like to hold it down. More services; more demands for services; more money.

Small Business: Don't Wait Too Long

Small business can expect some help from Congress. But it won't come in the form of significant tax help or other major points.

The Senate Small Business Committee is looking into ways to help small business. It is genuinely concerned because many small firms are caught between high costs and competition from the giants.

Some measures advanced include:

A plan for cutting federal taxes for firms earning under \$25,000 a year.

Rewriting federal rules governing renegotiation to make government contracts more attractive to small firms.

Distributing more technical data to small companies.

Reducing paperwork required for small outfits holding government contracts.

A possible plan to offer small firms free advice and counseling on management matters.

But these measures may or may not be written into law. Less controversial points stand a much stronger chance.

Investigate Production Savings

made possible by Denison's 1-Ton Multipress



No scrap Riveting electrical controls in bakelite cases with the 1-ton Multipress has virtually eliminated breakage for Therm-O-Disc, Inc., Mansfield, Ohio. The press ram automatically reverses when the pre-set pressure of 900 pounds is attained.



Twice the output Three 1-ton Multipresses are used for broaching, burnishing and stripping operations at Lamson & Sessions, Cleveland, Ohio. Production was doubled over previous methods; pinpoint accuracy is obtained with semi-skilled operators.



Higher quality Peening studs less than $\frac{1}{4}$ " long was a ticklish job made easy by the 1-ton Multipress. Health-Mor, Inc., Cleveland, Ohio, manufacturer of vacuum cleaner parts, has found that ease of Multipress operation greatly improves product quality.

Let Multipress point the way to production economy



For complete information, write:

DENISON ENGINEERING DIVISION

American Brake Shoe Company
1242 DUBLIN ROAD • COLUMBUS 16, OHIO

EXPANSION IN INDUSTRY

Alloys:

Production up 700 pct for Allegheny Ludlum superalloy.

An increase in producing capacity of 700 pct in less than two years. That's what user acceptance of superalloys from Allegheny Ludlum's consumable electrode vacuum melting process made possible.

A-L began production of these high purity alloys in Oct., 1955 with a monthly output of 250,000 lb. The process consists of making cast electrodes of an alloyed, predetermined composition from a production-size, electric furnace air melt. These electrodes are then remelted under vacuum by arc melting in a water-cooled copper crucible. Advantages claimed for

the process are improved metal cleanliness, lower gas content and closer control of solidification rate.

"Because of the demand for this new product," says E. J. Hanley, A-L president, "we will complete our third expansion to two million pounds per month by June of this year. We will soon be producing ingots up to 26 inches in diameter weighing 8000 pounds."

Mr. Hanley adds that his company has installed a vacuum induction melting facility for producing ingots up to 2000 lb. This process—a complement to the consumable electrode vacuum melting—is also for high purity alloy products. With it, high content oxidizing alloys for improved physical properties can be added and retained in the base metal.

Allegheny continues work in the field of the special metals—zirconium, uranium, columbium and molybdenum.

"Today," states Mr. Hanley, "Allegheny is melting hafnium-free zirconium sponge into ingots and converting much of it into mill products for atomic energy applications. By the middle of the second quarter, we will have a fourth zirconium furnace in operation and be able to produce 100,000 pounds per month."

He points out that about one-sixth of the company's sales and one-third of its profits in 1956 came from products the firm didn't make five years ago.

Lukens Testing Lab

Lukens Steel Co., Coatesville, Pa., producer of specialty steel plate, will build a new physical testing laboratory.

Ground will be broken within the next few weeks. Completion is expected within a year. Cost will be about \$1 million.

Charles Lukens Huston, Jr., company president, said "unprecedented industrial demand" for alloy and alloy-clad steel plate was the reason for the project.

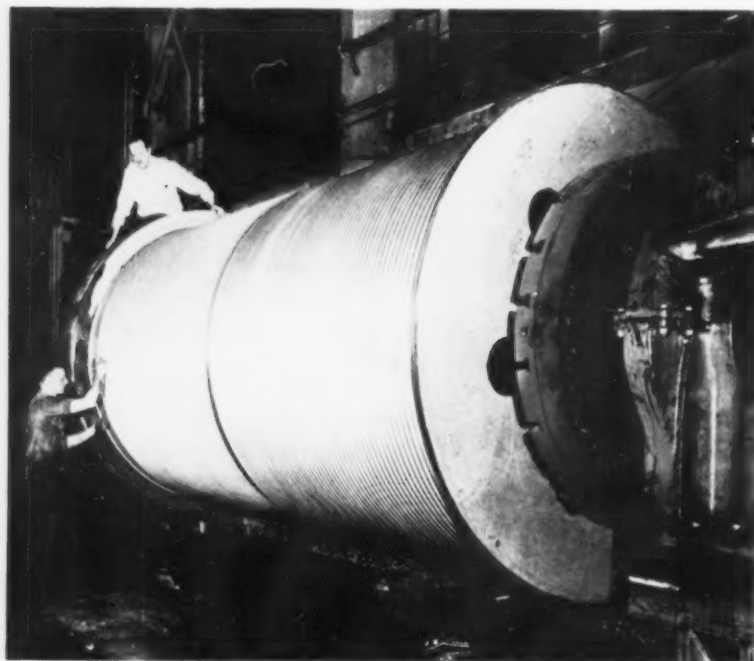
Expansion Briefs

Avco Manufacturing Co., Lawrence, Mass.; new research and advanced development center, Wilmington, Del.; cost \$15 million.

Ryan Aeronautical Co., San Diego, Calif.; new engineering and laboratories building; cost about \$500,000.

Admiral Corp., Chicago; 150,000-sq-ft addition to the electronics plant at Harvard, Ill., daily capacity, 6000 TV receivers, 1000 hi-fi's.

Alloy Steels, Inc., Detroit; building new metallurgical laboratory.

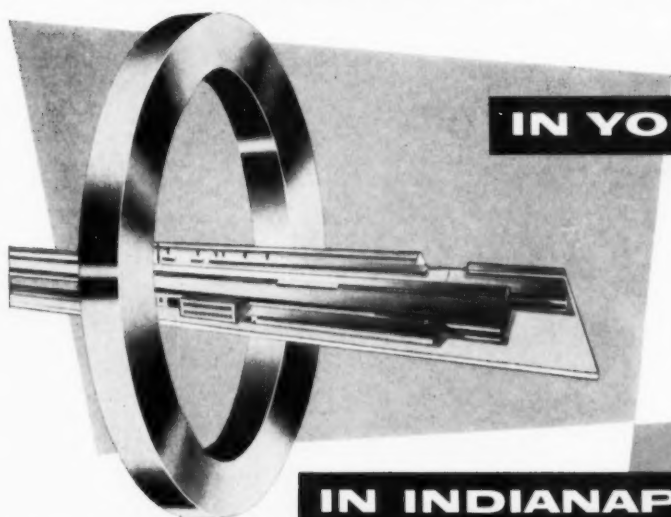


HOIST drum receiving its finishing touches is one of two which will be used to handle a 500 ton hot metal ladle crane being constructed by Morgan Engineering Co., Alliance, O., for a large eastern steel mill. The unit will be driven by 1658 hp from 11 electric motors.

TRY CMP's 3 IN 1 SERVICE

**FOR RESTRICTED SPECIFICATION
COLD ROLLED STRIP STEEL**

Now there are 3 CMP plants equipped with today's most effective rolling and processing facilities for the production of "restricted specification" cold rolled strip steel. Strategic plant locations provide CMP customers with the security of 3 sources of supply, plus the opportunity for close working relationships which these local production centers make possible.

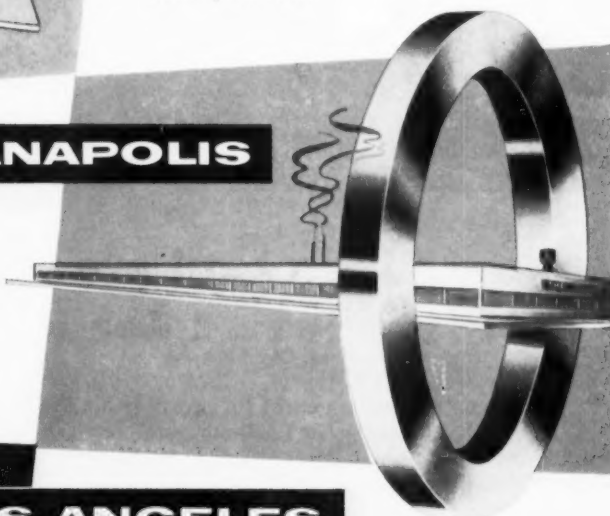


IN YOUNGSTOWN

General office headquarters and production facilities where CMP pioneered the processing of "restricted specification" cold rolled strip steel. Laboratory and research facilities are also here, staffed for continuing development and improvement of CMP products.

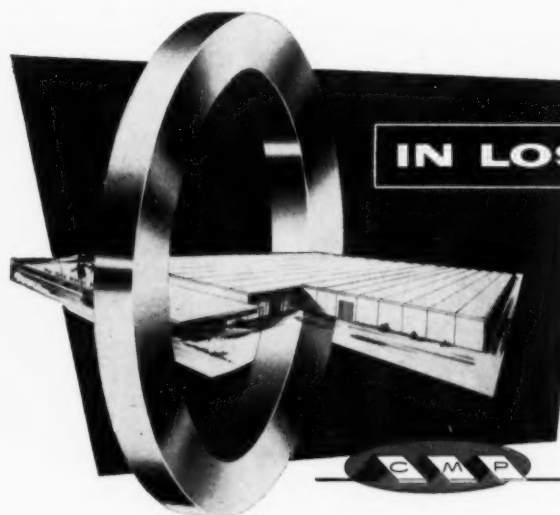
Geographically situated to conveniently serve the fast growing midwestern market for specialized cold rolled strip, this recently built, all-new plant utilizes identical processing equipment as other CMP plants for producing a wide range of "restricted specification" cold rolled strip.

IN INDIANAPOLIS



IN LOS ANGELES

Latest addition to CMP's producing facilities is this Los Angeles unit, the only plant in the West with CMP-type equipment. Faster service for West Coast steel fabricators, plus the know-how of steel mill-trained personnel provide a service opportunity not heretofore locally available.

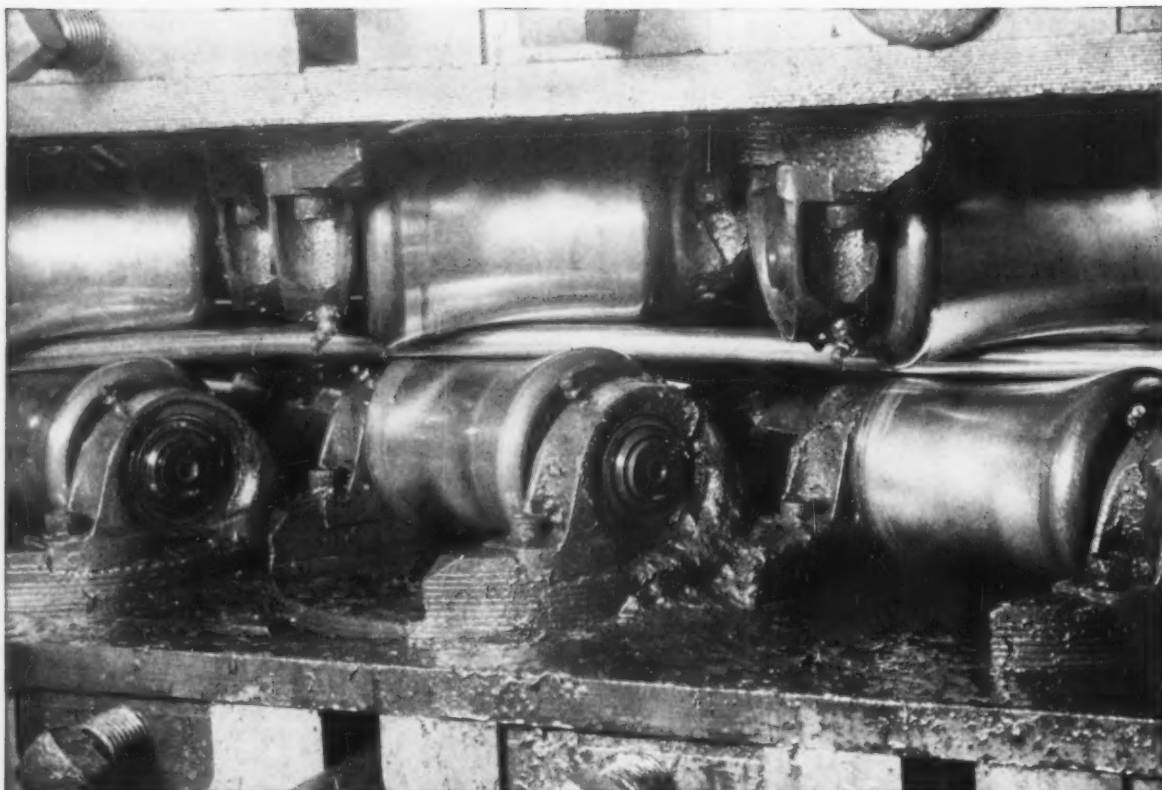


THE COLD METAL PRODUCTS CO.
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SALES OFFICES: NEW YORK - CLEVELAND - DETROIT - INDIANAPOLIS
CHICAGO - LOS ANGELES - SAN FRANCISCO

Try CMP for 3 in 1 Service

Low Carbon, High Carbon — Annealed or Tempered, Stainless, Alloy, Electro Zinc Coated

February 28, 1957



Uses tool steel that outwears others 3 to 1 for its straightener rolls

TO help its customers get the longest possible life out of the rolls used in its small tube straighteners, Mackintosh-Hemphill Division of E. W. Bliss Co. makes them from Graph-Mo® steel.

Graph-Mo contains millions of tiny particles of diamond-hard carbides. As a result, users report it outwears other tool steels on an average of three to one!

Graph-Mo steel also contains free graphite which gives it outstanding anti-friction properties, prevents pick up and scoring. This is a big advantage to users of small Mack-Hemp straighteners because it results in a better surface on the products being processed. What's more it eliminates chrome plating the rolls,

which is usually necessary when the straighteners are used for non-ferrous metals such as brass.

Graph-Mo steel gives Mackintosh-Hemphill two other important manufacturing advantages. It saves machining time because it's 30% easier to machine than ordinary tool steels. And it simplifies heat treating because of its uniform response to heat treatment.

Graph-Mo is one of four graphitic tool steels developed by the Timken Company. If you want more information about their use in dies, punches, gages and machine parts, write for the new Timken Graphitic Steel Data Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* STEEL

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

REPORT TO MANAGEMENT

Is This A Plateau?

The business world occasionally picks up a term that describes a given set of conditions. Then it proceeds to work it to death. A case in point is "plateau," which is currently ascribed to the state of economic activity.

But because it describes a leveling off, plateau also implies a subsequent downtrend. There's no doubt that the economy is on a plateau, but take a look at the level of it.

The national summary of business conditions for January and early February gives a pretty good idea. The Federal Reserve Board says industrial production in January was slightly below the record level.

The Board's index of industrial production was at 146 compared with 147 in December and 146 in October and November. This is two pct above a year earlier. The very reliable barometer of output of electricity and gas in January was seven pct up over a year previously.

Not all industry fared alike. Some of the most important: Auto production in January and February rose about 10 pct over a year ago. TV sets and most major household goods lagged moderately. Nonferrous fabricators and iron and steel foundries also declined, in contrast to record steel output.

The Board points out that industries producing industrial equipment continue at peak output. Mineral production to supply metalworking was unchanged in the new year. But coal production declined moderately.

As a result, employment remained at a record level of 52.1 million (seasonally adjusted). Weekly pay averaged \$82.41, down two pct from the December peak.

It's true that there are some ups and downs. But, if this is a plateau, you can stand a lot more of it.

Flood Insurance On The Way

If your plant is in flood-prone areas, here's something to think over. Federal flood insurance should be ready for buyers by the time Congress votes the money for the program.

Setting rates for the insurance is one of the biggest problems of the Federal Flood Indemnity Administration. Private insurers have suggested that the rates might range from \$2.50 to \$20 per \$100, without the federal subsidy.

But with the \$100 million subsidy, asked by FFIA, estimated rates would be from \$1.50 to \$12 per \$100. Exact rates will depend on type of coverage and location of property. Rates can also be trimmed by use of deductibles.

The agency says 5000 insurance firms and 150,000 local agents and brokers have agreed to help in the program. Some 5000 adjusters can be called to handle claims.

It's viewed as a program for the small property owner, with limits of \$10,000 for a home, \$250,000 for industry. There are no indications as to response when the program is offered. There is some feeling that, in spite of the subsidy, rates may discourage would-be insurers.

Not All Prices Are Up

Generally, commodity prices continue their upward trend into inflationary levels. But this doesn't cover everything.

On the upgrade are wholesale commodity prices. Steel and petroleum prices lead the upswing in industrial commodities. But scrap, both steel and nonferrous, declined. Refined copper and brass also reversed the general trend with declines.

INDUSTRIAL BRIEFS

Power Play . . . Ohio Edison Co. has awarded a \$9.2 million contract to Westinghouse Electric Corp. for two turbine-generator units for the utility's new Stratton, O., power plant. The move to enlarge facilities will increase the total cost of the power plant from \$62 million to \$116 million. Scheduled for operation in 1960 and 1961, the company claims the additional units will make the Stratton plant the largest power producer in the Ohio Edison system.

Follow the Sun . . . Trent Tube Co., subsidiary of Crucible Steel Co. of America, will open a second plant to manufacture welded stainless steel and high alloy tubing and pipe. The plant will be located at Fullerton, Calif. It is scheduled to be completed and ready for operations before the middle of the year.

New Partner . . . N.R.C. Metals Corp. is now jointly owned by National Research Corp., and Columbia-Southern Chemical Corp. It was formerly a wholly owned subsidiary of National Research Corp. The company has a purchase agreement to supply AEC with 3.5 million lb of zirconium and hafnium. A new plant in Florida, scheduled to go into production late in 1957, will be the nation's first fully integrated facility for production of high-purity zirconium and hafnium in sponge form for smelters and fabricators, N.R.C. says.

Bolivian Bolero . . . Ventures Ltd. of Canada, and Vitro Minerals Corp. have formed a jointly owned company, Bolivex Corp., to explore the untapped mineral resources of Bolivia. Field work will commence this spring after arrangements are completed with the Bolivian government.

Fast Fifty . . . General Electric Corp. will build \$840,000 worth of new type, lightweight, electrical propulsion equipment for 50 Hudson and Manhattan Railroad rapid transit cars. The cars will be built by St. Louis Car Co. Delivery is scheduled late in 1957 of the complete units to H & M.

Block of Stock . . . Denver Equipment Co., Denver, presented 100 shares of Curtis-Wright Corp. common stock to the Colorado School of Mines. A. C. Daman, president of Denver Equipment, was a member of the Class of 1915 at the Mining school.

For The Fleet . . . Contracts totaling over \$2 million for engine room equipment have been awarded to General Electric Company's Small Steam Turbine Dept. Equipment will be used on two Guided Missile Frigates, units of the U. S. Navy's expanding Atomic-Age combatant fleet. Part of the order covers twelve mechanical drive turbines which will drive the boiler's horizontal main feed pumps. All of the turbines are of the DRV-125, 600 hp type. There will be six turbines aboard each frigate.

Ceramic Center . . . Ferro Corp., Cleveland, will consolidate all its ceramic research projects in a single Ceramic Technical Center at Cleveland. Work on porcelain enamel, ceramic glazes, colors, refractories and cermets will be carried on for plants at Cleveland, East Liverpool and Crooksville, O.; Nashville, Tenn.; Salem, Ind.; Tyler, Tex.; Los Angeles, and 11 foreign countries.

Switch Suffix . . . Continental-Diamond Fibre Div., of the Budd Co., has changed its name to Continental-Diamond Fibre Corp. The switch in no way affects its association with the parent company.

What's In A Brick . . . Contracts for the construction of a new research center at Curwensville, Pa. have been let by the North American Refractories Co. of Cleveland, O. The new center, to cost \$300,000, is scheduled for completion in October, 1957. The facility will coordinate all phases of quality control and will develop new products for the entire North American Refractories organization.

New Pastures . . . Detroit Gray Iron Foundry Co. has purchased the Valley Steel Casting Co., Bay City, Mich. This additional capacity in its steel casting division will enable DGIF to give more complete casting service.



by *Lansing*

at your Service for...

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ESTABLISHED 1914

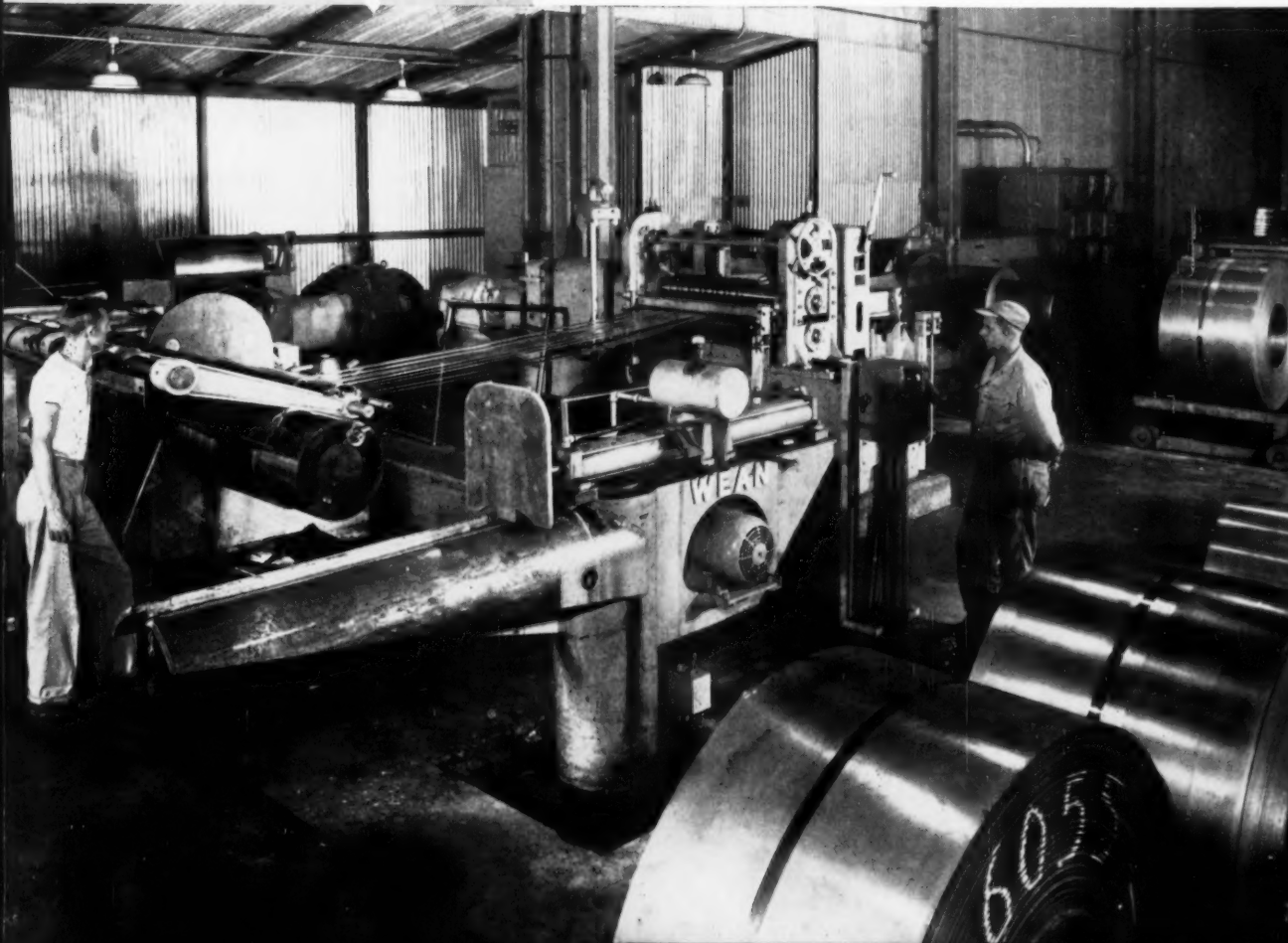
LANSING 2 MICHIGAN

Slitting is faster, more accurate because of



WEAN

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160



● Wean high speed slitting lines are being used by more and more of the nation's steelmakers because they are engineered to perform the most accurate slitting job at cost reducing speeds. And, auxiliary coil handling equipment is designed to keep the steel moving — to get maximum production from the line at all times.

If slitting is part of your operation, get the last word on high production slitting from Wean engineers before you buy.

THE WEAN ENGINEERING COMPANY INC., WARREN, O.



AUTOMOTIVE ASSEMBLY LINE

Auto Labor Maps 1958 Contract Demands

Short week and more pay are Nos. 1 and 2 on the list . . . Reuther wants to lure rebel skilled automotive workers back into the fold . . . Possible dues increase may stir more dissension—By T. L. Carry.

♦ **UNION MEN** already are beating the drums in preparation for the United Auto Workers 1958 contract demands.

At a recent rally marking the 20th anniversary of the now famous Flint sitdown strikes, UAW leaders said the union is setting its sights on bigger and better economic gains for the membership.

The propaganda has already

started to roll out and will increase in intensity after the UAW convention at Atlantic City in April.

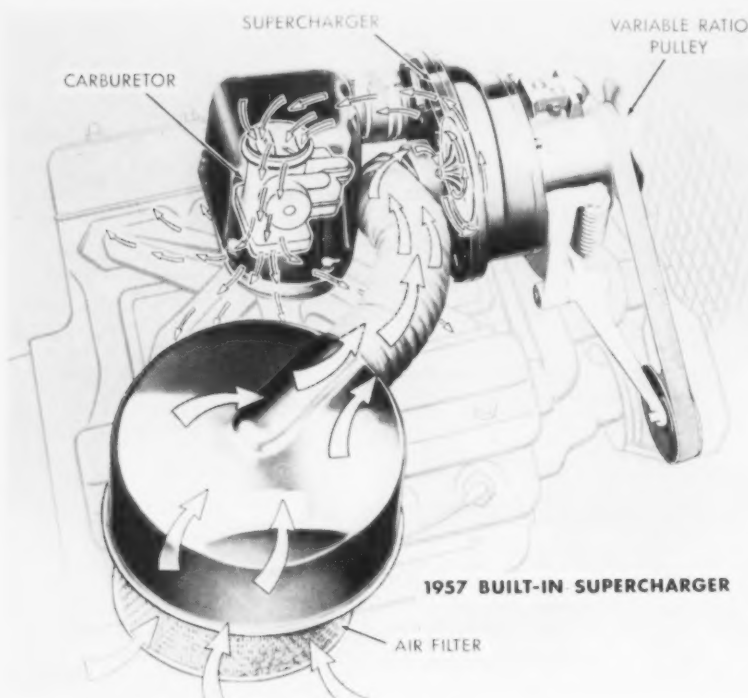
Short Week First . . . There are at least three big things that will happen at the session. First will be the demand for more pay and a shorter week. Secondly, the union will make some effort to pacify dissident skilled workers.

Third, there will be a proposal for a dues increase of 50 cents a month.

The shorter work week is the prime objective of Walter Reuther, UAW president, at next year's bargaining sessions. It serves Mr. Reuther's purposes rather well.

It will pay a long standing debt to Carl Stellatto, president of the huge Ford Local 600. Stellatto had advocated pushing for the short week instead of making the all-out assault for supplemental unemployment benefits in 1955. In exchange for his support, the UAW leadership indicated it would make the short week the next major objective.

Supercharger Popularity Grows



SUPERCHARGER being built into an increasing number of Studebaker-Packard engines is claimed to improve performance during passing or acceleration yet holds the line on horsepower and engine size. It represents 28 pct of Studebaker-Packard engines now being produced.

Skilled Workers Rebel . . . The demand will give Mr. Reuther a chance to show the membership that he is continually working in its behalf. The UAW president has just recently served notice that his union will be out for greater gains than ever in 1958.

There seems little likelihood that union leaders will run into any trouble on the shorter week issue. There isn't any doubt that backing for the demand will be unanimous.

Mr. Reuther may have some trouble with his skilled workers. Some of these men formed a rump organization called the Society of Skilled Trades after the 1955 negotiations. They were dissatisfied with the benefits they received.

The skilled workers claimed at the time that there wasn't enough difference between their wages and those of the factory workers. Dissatisfaction spread quickly and some organizational work was



Where the "stress" is on strength

BETTER than 4500 horsepower in today's Diesel units can send crack trains highballing down the main track at close to 100 mph.

Pounding up and down hundreds of thousands of miles a year . . . starting and stopping countless times . . . whipping around curves . . . this is service that subjects these 350,000 pound "iron horses" to fearsome stresses.

Naturally, the thousands of standard nuts and bolts that keep these powerful streamliners together *must* be absolutely reliable . . . *must* be strong, flawless.

RB&W—A MAJOR AND RELIABLE SUPPLIER
A leader in its field for over 111 years,

RB&W continues to turn out the finest fasteners for the nation's vital railroad industry and, in fact, for virtually every major industry.

Modern facilities, new techniques, long experience . . . all combine to make RB&W fasteners truly the "strong point of any assembly."

CONTACT THE RB&W "FASTENER MAN"

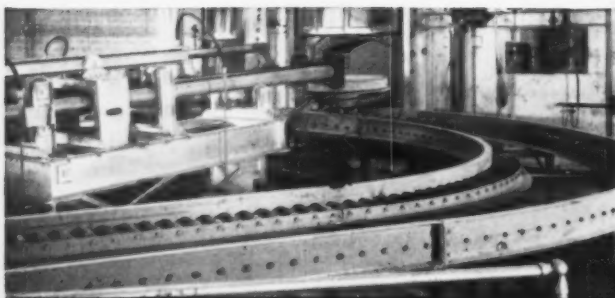
Proper application of standard fasteners can save you money. Ask the RB&W "Fastener Man" to show you how. Contact your nearest RB&W office.



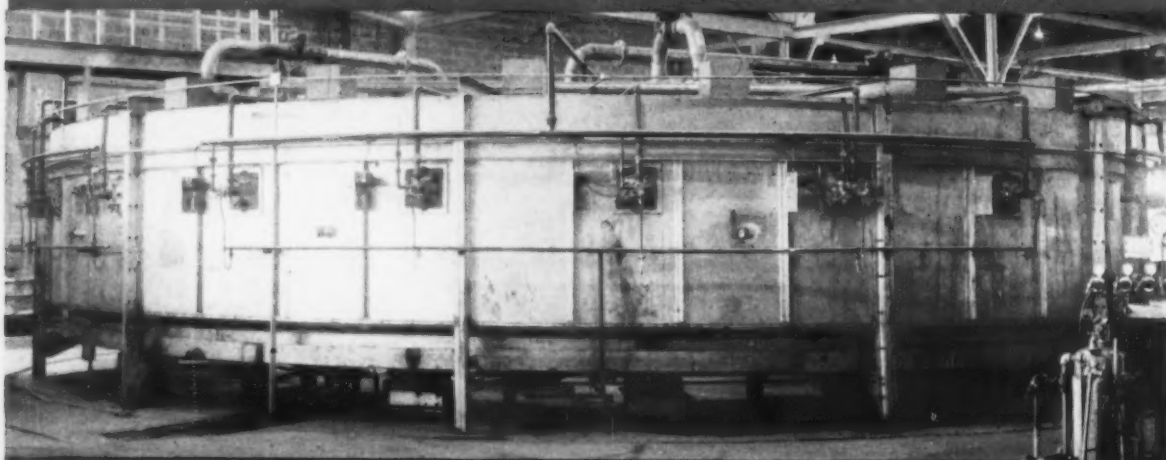
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RB&W FASTENERS - *Strong Point of any assembly*



This furnace is set up for automatic loading in regular plant production line.



This field-erected Lindberg rotary hearth furnace is one of several completed, under construction and on order, for plants in U. S. and Canada.

Every so often we want to remind you . . .
LINDBERG Builds Big Ones!

Yes, Lindberg does build big ones! The rotary hearth furnace shown here was field-erected by Lindberg Industrial. It is used for heat treating car wheels and is set up for automatic loading. It's outside diameter is 44 feet and capacity is over 13,000 lbs. per hour.

This is just one of many types of industrial heating equipment, heat treating furnaces, melting furnaces, enameling furnaces, ceramic kilns, that Lindberg is prepared to design, construct and install in your own plant.

Lindberg's years of experience in the broad field of industrial heating equipment, its staff of expert laboratory technicians and seasoned application engineers assure your getting the best suited installation for your process and production requirements.

Whatever your needs, if it has anything to do with the application of heat to industry, better talk it over with Lindberg. Just get in touch with your nearest Lindberg Field Office (see your classified telephone directory) or write us direct.



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Automotive Production

WEEK ENDING	CARS	TRUCKS
Feb. 23, 1957	138,537	23,220
Feb. 16, 1957	145,846	23,178
Feb. 25, 1956	125,537	22,673
Feb. 18, 1956	120,320	23,227
TO DATE 1957	1,103,806	169,274
TO DATE 1956	1,086,346	192,117

*Estimated. Source: Ward's Reports

actually completed in the industrial counties surrounding Detroit.

The UAW is aware of all this and is out to pacify the skilled workers at the convention.

Separate Agreements . . . The solution to the problem is likely to take the form of a promise to negotiate some type of separate agreement in new bargaining sessions that would apply only to the skilled workers.

If this is the case, it would serve the union's purpose beautifully.

Mr. Reuther would then be in the position where he could confront management with demands from both types of workers. Once the contracts were negotiated, the UAW leader could then demand more and better things for both classifications every time the contracts came up for negotiation.

Chances are that he could get them because he would have a double barrelled strike weapon. In short, the skilled workers could go out on strike even though the factory workers were satisfied or the reverse could be true.

In addition to this possibility, it is a known fact that all of the Big Three contracts terminate at the same time next year.

Keep in mind how well Mr. Reuther played Ford against General Motors in 1955 to get a form of the guaranteed wage. Opinion here is that he will be able to play the game even better in 1958 when three companies are involved.

Aluminum Deal For GM

Announcement by General Motors Corp. that it plans to build an aluminum foundry in Massena, N. Y., for casting automotive parts is further proof of the growing use of the metal

Harlow H. Curtice, GM president, says the foundry will be built near a reduction plant which will be constructed by Reynolds Metals Co.

The aluminum will be transported in a molten state directly to the foundry for pouring.

The arrangement between GM and Reynolds is similar to one which the metal company has with Ford in Alabama.

The GM plant will be operated by the Chevrolet Div. and such things as pistons, transmission housings and smaller aluminum parts will be produced there.

WAGONS:

Nash to make one for first time.

American Motors Corp. is presently tooling up for production of both a Nash and Hudson station wagon in 1958.

It's the first time that a full-size Nash wagon has ever been built. Hudson has not built a station wagon for many years.

Officially, the company says that it will make the new wagons because of the notable success of

AUTOMOTIVE NEWS

the Rambler, the compact car which has been increasing its sales for many months. This undoubtedly is the reason for introduction of the new line.

However, it is significant to note the timing of AMC's announcement. Ordinarily, news about new cars is held up until they are actually introduced. It is sometimes harder to sell old products if people know that new and better things are coming along.

The announcement follows closely an AMC stockholders' meeting at which it was demanded that the company drop the Hudson and Nash lines completely.

Management disagreed and the latest announcement shows definitely that the company has no intention of dropping either the Hudson or the Nash.

Only time will tell whether or not it is a wise choice to broaden the Hudson and Nash lines. It is not known at this writing how much tooling is involved for the new models.

THE BULL OF THE WOODS

By J. R. Williams





still the winner
... and in high speed steels,
nothing beats REX

The winner and still champion after fifty years is Crucible's REX high speed steel. *And now it's better than ever!* Recent improvements in manufacturing processes have given even higher quality and greater uniformity to every one of its properties.

Why not shop test the new REX yourself? Test it for size, structure, response to heat treatment, fine tool performance. Give it any test you wish. You'll see why it is today, as it has always been — *the standard by which all other high speed steels are compared.*

Ask for REX by name at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for information on REX, and the other Crucible special purpose steels, send for the *Crucible Publication Catalog*. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America



Labor Political Strategy Shapes Up

Unions will work through friendly congressmen . . . Aim is to pin "unjustified price increases" label on industry . . . Reuther and Dave McDonald are active in laying groundwork—By G. H. Baker.

♦ **LABOR LEADERS** pin their hopes for another round of wage rises on their friends in Congress.

Union officials are putting fresh heat on leading Democrats (plus some Republicans) in the Senate and the House to start a public investigation of industrial profits.

The strategy is to insist on public hearings. Labor witnesses will work hand-in-glove with "friendly" congressmen in the public questioning. The question-and-answer exchanges will be framed to put over the idea that another round of wage increases is "essential" this year because of the "unjustified price increases" that have resulted solely from "profiteering" by businessmen.

McDonald Active . . . Nothing will be said of the cost increases forced upon industry by the across-the-board wage increases negotiated in 1956.

Walter Reuther's United Auto Workers and Dave McDonald's United Steel Workers are particularly active in laying the groundwork for these hearings. They are working closely with "friendly" congressmen so as to obtain the maximum publicity for their "case" for another round of increases.

On both sides of the political aisle, it is noted that McDonald is anxious to quiet his opposition within the USW by gaining new wage increases.

Dollars for COPE . . . AFL-CIO leaders served notice on the rank and file to kick in another \$1 per head this year for political expenses.

The funds will be used by the AFL-CIO Committee on Political Education (COPE) to pay campaign bills in 1958 elections.

Nationwide . . . The AFL-CIO has nearly 16 million members. If everybody "gives a buck" as requested, this adds up to a campaign fund of between \$15 million and \$16 million.

Up to now, they've never collected anything like that. The top

thus far is around \$3 million. The union will have to get a lot more cooperation from its members.

In addition to paying some campaign bills for labor's "friends" in the primary elections, the AFL-CIO wants to start now to build a nest-egg for the congressional and state elections to be held in November, 1958.

With a few exceptions, AFL-CIO political funds are used to pay the bills of Democrats.

Charlie Wilson Stays On



It looks now as if Charles E. Wilson will continue in office as Secretary of Defense until sometime next year. There had been talk that the plain-speaking defense boss would quit his post before June 30. But President Eisenhower evidently has prevailed upon Mr. Wilson to postpone until next year any plans for stepping down.

Washington observers believe there are three main reasons why Ike wants Mr. Wilson to remain as Secretary of Defense:

1. The White House realizes

that Mr. Wilson is a superior administrator. He has done much in the past years to force efficient methods upon the Pentagon's legions of chair-borne generals and admirals.

2. Ike has not yet got a successor lined up. The White House is naturally reluctant to nominate a "second-best" Defense Secretary.

3. Any nominee for the position of Secretary of Defense must be approved by the Senate, and Senate Democrats are gleefully awaiting an opportunity to "work over" any nominee that Ike sends.

WHEELABRATOR® STEEL SHOT

**Plays a Vital Part in Slashing Cleaning Costs
in Thousands of Foundries Everywhere**

STEEL FOUNDRY CUTS ABRASIVE COST OVER 50%

Walter Berg, Maintenance Supt. of Unitcast Corp., Toledo, reports that they were able to cut abrasive costs from \$1.40 per ton of castings cleaned to 60c, a saving of more than 50%, by switching to Wheelabrator Steel Shot.



This is a savings of more than \$10,000 a year in shot costs alone. Additional savings accrue in greatly reduced parts wear and maintenance time. Unitcast cleans alloy steel castings such as those pictured below.



Get ALL the Facts

about Wheelabrator Steel Shot . . . the abrasive to which over 1,000 plants have changed in the past 2 years. Ask for Bulletin 89-B

\$100 Does The Work of \$229 When Wheelabrator Steel Shot is Used



ORDINARY ABRASIVE

Cleaned 65 tons of gray iron castings for \$100 in abrasive costs.



WHEELABRATOR STEEL SHOT

Cleans 149 tons of castings for \$100. To clean 149 tons with the ordinary abrasive previously used cost \$229.

Multiple savings were effected at Swayne, Robinson & Co., Richmond, Ind., a gray iron foundry, by converting from ordinary abrasive to Wheelabrator Steel Shot. Abrasive costs were slashed from \$1.54 to 67c per ton of castings cleaned — a reduc-

tion of 57%. In addition, the general foreman reports, "The wear on our Wheelabrator has been greatly reduced, effecting savings in replacement parts and maintenance labor." Cleaning time has also been reduced — from 7 hours daily to only 4 hours.

Greater Productivity At Less Cost

Wheelabrator Steel Shot, made of heat treated electric furnace steel, is the finest blasting abrasive ever developed. It has the hardness for faster cleaning, the toughness and solidity for longer life; it rebounds for greater coverage; it is always round for low maintenance costs; has a warranted quality for uniform results; and gives performance for lowest overall cleaning costs. Examples of its top flight performance:

Savings in Abrasive Costs

An Ohio steel foundry.....	60%
A gray iron valve foundry.....	40%
An Eastern malleable foundry.....	38%
A St. Louis steel foundry.....	51%
A Cleveland gray iron foundry.....	46%

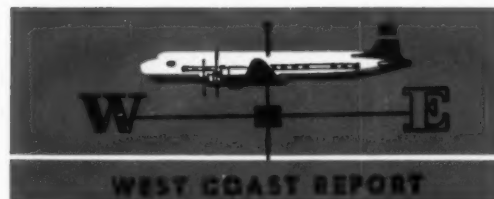
SAVES 23% ON SHOT COST IN CLEANING ANNEALED STEEL CASTINGS

Crucible Steel Casting Company of Milwaukee cleans large steel castings after heat treating. With ordinary abrasives, the cost per wheel hour was \$1.57. With Wheelabrator Steel Shot, the cost per wheel hour has dropped to only \$1.215, a saving of 23%. With 10 wheels in the plant blasting 10 hours a day, annual savings in shot cost are estimated at \$8,000.

WHEELABRATOR CORPORATION

509 S. Byrkit Street, Mishawaka, Indiana

World's largest manufacturers of Steel Shot



Warehouse Sales Reflect Area Growth

Farwestern steel distributors sell 25 pct of domestic steel tonnage, while national average is only 21 pct . . . Population gains, a large increase in industrial jobs spur metalworking's growth—By R. R. Kay.

♦ **SELL HARD**—if you want the business—that's the creed of steel warehousemen on the West Coast. And it's working out OK for them. Business is good, and they expect a bang-up 1957.

Warehousemen in the area are much better mill customers than those in any other section of the U. S. Last year, in the Western district, they sold 25 pct of the domestic steel tonnage, while the national average was only 21 pct.

The Permanent Visitors . . . As the area grows in population, warehousemen see their business going one way—upward. They have impressive figures to back them up. About 1300 people come to live in California every day. And it's been that way since 1950. Some 200,000 brand new jobs are created every year.

Between 1947 and 1956, California's industrial jobs rose from 663,000 to 1,156,000—an increase of 74 pct! And the number of jobs keeps advancing. Today's figure is 1,215,800.

The state uses 4.7 million net tons of steel—some 73 pct of the total sold in the seven Farwestern states. So Kaiser Steel indicates in its latest report, "Western Steel Market."

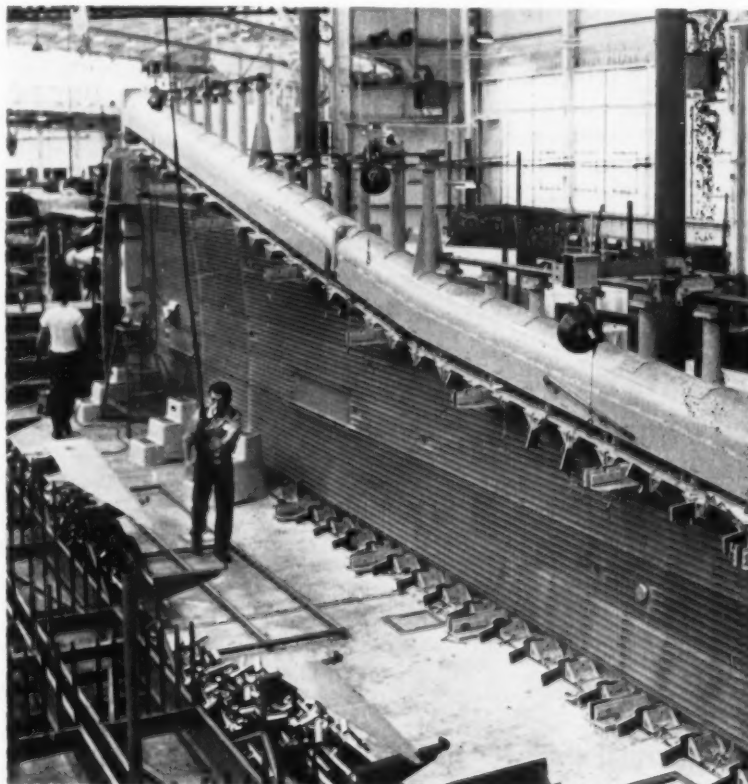
Top Slot for Metals . . . In the area's march to make more goods for its own needs, primary and fabricated metals, transportation equipment, machinery, and electrical machinery and equipment are right at the head of the list.

Charles E. Ducommun, president, Ducommun Metals & Supply Co., Los Angeles, one of the

nation's largest warehouse organizations, says there will be even greater dependence on the warehouse as the area develops industrially. And Robert G. Welch, executive secretary, American Steel Warehouse Association, believes that West Coast warehousemen are the most aggressive in the country and have the soundest warehouse practices. Their collections record is tops.

Dam Progresses

The \$250 million Rocky Reach dam on the Columbia River is slowly taking shape. The dam is 10 miles north of Wenatchee, Wash. More than 300 men are at work on the first stages of construction, building cofferdams and cement mixers. Stone and Webster Engineering Corp. is supervising the work for the Chelan County Public Utility District.



STIFFENED UPPER SKIN for wing of Lockheed's Electra prop-jet transport is readied. Job is completed in king-sized assembly jig before transfer to main assembly area for final buildup of the complete wing.

ONE OF A SERIES . . .

What makes Hyatts run smoother and longer?

CARBURIZED INNER RACES

From a fatigue life standpoint, the inner race is the critical member of a roller bearing, because the smaller area of contact between rollers and inner race concentrates the loads upon it. That's why HYATT goes to the added expense of *carburizing* every inner race—to assure you the performance and fitting advantages detailed at the right.

You will find full selection and application data in HYATT Catalog 150, or call your nearest HYATT Sales Engineer. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey. Sales offices at Harrison, Pittsburgh, Detroit, Chicago and Oakland, Cal.



HYATT

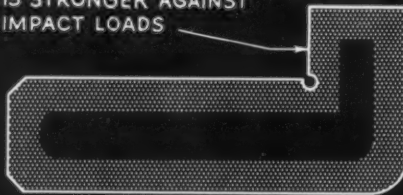
HEAVIER INTERFERENCE FITS

Resistance to relative movement between inner race and shaft is vital to good performance. So HYATT makes practically all inner races of carburizing type nickel alloys instead of through-hardened steel. After carburizing and heat-treating, the outer surface has the hard wear resistance so necessary for an efficient bearing. The low-carbon core remains tough and ductile to permit much heavier interference fits than are otherwise possible.

TOUGHER FLANGES, GREATER LOAD CAPACITY

Carburizing also enables HYATT to obtain substantially tougher inner race flanges. Tests show the shoulders will withstand considerably greater impact loads (Figure 1). The carburizing process has also been found to increase the load-carrying capacity of the race by building up compressive hoop stresses in its external fibres during quenching.

THE SHOULDER OF A CARBURIZED RACE
IS STRONGER AGAINST
IMPACT LOADS

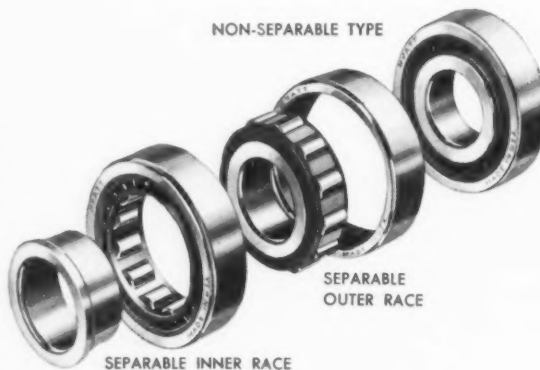


1

SIMPLER, LOWER-COST MOUNTING

Another advantage of HYATT'S heavier interference fits is the elimination of all auxiliary holding devices. When the carburized inner race is either pressed or shrunk on the shaft according to HYATT fitting recommendations, it becomes practically an integral part of the shaft itself. This permits mountings of the simplest type and lowest overall cost.

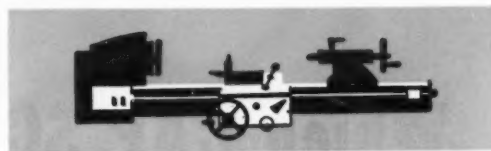
NON-SEPARABLE TYPE



SEPARABLE
OUTER RACE

SEPARABLE INNER RACE

HY-ROLL BEARINGS FOR MODERN INDUSTRY



MACHINE TOOL HIGH SPOTS

New Tools Work An Advantage In South

Southern metalworking firms are getting a flying start with modern equipment . . . Efficiency showings are tops . . . It suggests modernization programs are needed in other regions—By E. J. Egan, Jr.

◆ **PLENTY OF SUNSHINE** and easy access to "real fried chicken" aren't the only advantages many southern metalworking plants claim over their northern rivals. There's another little competitive item that seems to flourish in the Dixie climate: new machine tools.

In fact, with the extra advantages provided by modern equipment, "the South's new industries promise to achieve the nation's top productivity records." So says James C. Kelley, general manager of the American Machine Tool Distributors' Assn.

Top Efficiency . . . Kelley points out that 1000 or more new manufacturing plants start up below the Mason-Dixon line each year. And he says, "they're not handicapped—as are many older industries—by having to work with obsolete tools incapable of maintaining high speed production rates and precision quality."

Southern firms get "a flying start" with their new plants and new tooling, Kelley claims. And he adds that with this lead, they're showing "almost unprecedented efficiency, economy and record rates of productivity in such technical fields as electronics, aircraft, guided missiles and nuclear energy."

North Should Follow . . . Kelley also believes that a "sound nationwide program of machine tool modernization . . . can be one of the country's strongest weapons against inflationary pressures."

He points to studies showing that overall U. S. industrial productivity must be stepped up at

least 1.5 pct each year to match the needs of a growing population. "This means," he says, "that machine tools must perform at rates at least 15 pct faster than they did 10 years ago if they are to be considered useful and profitable under today's competitive and cost conditions."

That's only the quantity side of the picture. The need for widespread tool modernization or replacement is underlined even more strongly on a quality basis, Kelley feels. The precision demanded in metalworking today is far more exacting than it was 10 or even five years ago. As they stand right now, many older machine tools just can't meet these close-tolerance specifications, he says.



"I understood everything about this new machine until I looked at the instructions!"

Machine Tools, 1957

(Metal Cutting Types Only)

	Millions of Dollars
January Net New Orders	63.0*
January Shipments	76.6*
(*Tentative)	

Source: Nat'l Mach. Tool Bldrs' Assn.

Sales Barrier Cracked . . . Right in line with current demands for more machine tool speed and precision comes some interesting news: Pratt & Whitney Co., Inc., is off and running with about 30 firm orders for numerically controlled jig borers, hole grinders and rotary tables.

First production model of the West Hartford, Conn., firm's punched-tape-guided hole grinder is going to Ford Motor Co.'s Aircraft Engine Div. of Chicago. Other large aviation and automotive firms are right behind Ford on the shipping list.

Up to now, most numerically controlled machines have either been test models or highly specialized contouring units for aircraft's wings and spars. Thus, some sort of sales barrier seems to have been cracked by P & W's ability to roll up such an impressive backlog.

The firm's control system won't guide a cutting tool along a contoured path in three dimensions. But it will position the spindle of a jig borer or a hole grinder to an accuracy of 0.0001 in.

Which CAP SCREW is STRONGER?

The RIGHT Answer Can Save You
Money These FOUR Ways:

SAVE ... ON INITIAL COST PER CAP SCREW

SAVE ... ON ASSEMBLY COSTS

SAVE ... ON SHIPPING AND INVENTORY COSTS

SAVE ... ON MATING NUTS

... And, In Addition, You Get A
STRONGER, LIGHTER ASSEMBLY!

Appearances can be deceiving. For instance, of the two Cap Screws pictured at right, the one at top with the smaller diameter shank is the stronger. That's because it's a Lamson 1038 Double Heat Treated, high-tensile screw whereas the other is a more expensive Full Finished Cap Screw manufactured of a steel with lower tensile strength.

Ask for the Cap Screw
with the "1038"—L
on the Head.

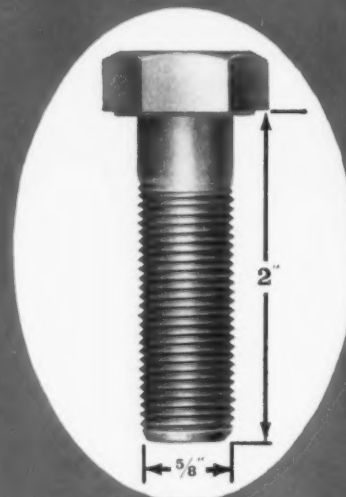
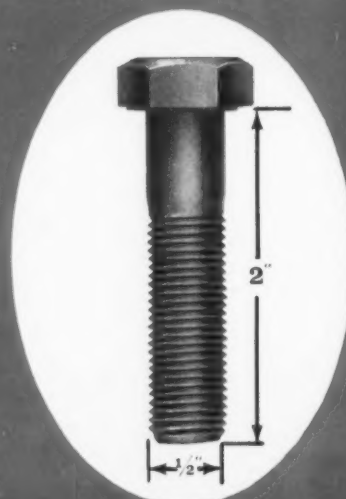


Send for chart showing the relative
strengths of these types of Cap Screws.
It could mean important savings on your
production line.

The Lamson & Sessions Company
1971 West 85th Street, Cleveland 2, Ohio

Please send me my free chart giving the facts on relative Cap Screw Strengths.

Name _____ Title _____
Company _____ St. & No. _____
City _____ Zone _____ State _____





The Iron Age SALUTES

William W. Hopwood President of Hagan Chemicals & Controls, Inc., he is keeping pace with an expanding economy through sound management planning. His type is a credit to industry's growing number of "second generation" executives.

Being the boss' son can sometimes be a handicap. An eager father, wanting his son to follow his footsteps, can push a lad too hard and too fast. Many a dissident offspring has taken a path other than the one chosen by an overzealous parent.

Such is hardly the case with William W. Hopwood, president of Hagan Chemicals & Controls Corp., and son of the late John M. Hopwood. Since he was old enough to spend summer vacations working in Hagan's laboratories, he regarded his Dad's business venture with enthusiasm, interest, and concern.

He became the corporation's third president in April, 1954, succeeding David J. Erikson.

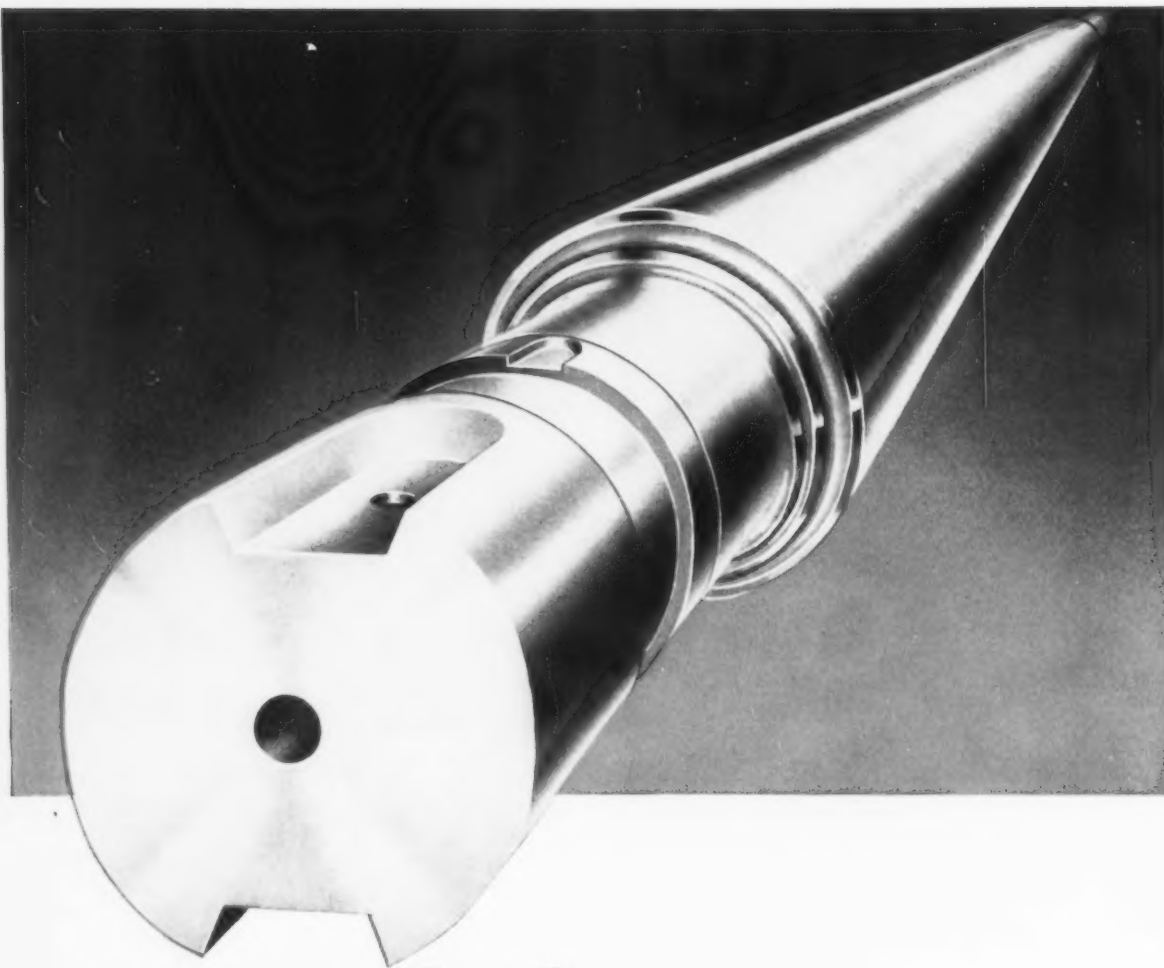
Since then Bill Hopwood has been busy developing a diversification program, improving sales tactics, and effecting a merger of the corporation's subsidiaries: Calgon, Inc., Hall Laboratories, Inc., and Buromin Co. "The merger," he

says, "is expected to give the company some important tax advantages and operating economies."

Under his direction, Hagan is expanding its line of industrial controls and instrumentation systems. One new product: a mechanical dust collector. In two years he has proved his management ability.

Born in Wheeling, W. Va., in 1915, Bill Hopwood moved with his parents to Pittsburgh the next year. By 1938 he had graduated from New York University's School of Commerce. He spent three years in his Dad's business and then was drafted into the Infantry in 1941. He emerged from service four and a half years later, a B-29 pilot.

Returning to Hagan Corp. after the war, he got to know every phase of the business. He took over the management reins in a way that is a credit to industry's growing number of "second generation" executives.



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Yes, precision is an unseen value, but a very important one in roll production, because you must have precision machined rolls to give your customers precision and uniformity in rolled metals.

That's why National has always given such close attention to producing and machining rolls to exact

specifications and close tolerances . . . and today, more than ever before, as a division of General Steel Castings, National has modern facilities plus additional metallurgical experience of the parent organization to give you rolls that will more than meet your expectations. Try National rolls and see.



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George C. McCormick, elected president, **Industrial Heating Equipment Co.**, Detroit; **Clifton E. Wenger**, elected vice president and secretary; **Eugene K. Buysse**, elected treasurer.

William B. Hall, elected president and general manager, **Vitro Uranium Co.**, Div. of Vitro Corp. of America; **Richard C. Cole**, elected vice president, Uranium Div.

Albert A. Thornbrough, elected president, **Massey-Harris-Ferguson, Inc.**, Racine, Wis.; **J. H. Shiner** and **H. A. Wallace**, elected vice presidents.

James R. Keough, elected vice president, manufacturing, **Fenwal Inc.**, Ashland, Mass.

W. Earl Dunn, elected vice president and general manager, The Chemical Plants Div., **Blaw-Knox Co.**, Pittsburgh.

Robert M. Haldeman, elected vice president, **Braden Copper Co.**, subsidiary of Kennecott Copper Corp.

Reginald L. Johnson, elected vice president, **Johns-Manville Sales Corp.**, New York.

Hal O. Gummere, elected executive vice president, **Buckeye Tools Corp.**, Dayton, O.; **Ernest B. Meynard**, elected vice president, sales.

H. T. Ross, elected vice president, engineering, **Linde Air Products Co.**, Div. of Union Carbide and Carbon Corp.

John E. Johnson, elected vice president, sales, **Datamatic Corp.**, Newton Highlands, Mass.

Philip K. McCullough, elected executive vice president and asst. treasurer, **The Mercury Mfg. Co.**, Chicago.

John A. Robertshaw, Jr., elected vice president, **Robertshaw-Fulton Controls Co.**, Greensburg, Pa.

John E. O'Brien, appointed district sales manager, Philadelphia, **Kelite Corp.**; **A. E. Sakavich**, named in charge of sales development service, Berkeley Heights, N. J.

John W. Muse, appointed New England district sales manager, **Federal Pacific Electric Co.**

Ralph G. Greer, appointed manager, sales, Construction Equipment Div., **International Harvester Co.**, Chicago.

Donald A. Fitch, named asst. manager, sales — pipe lines, National Tube Div., **U. S. Steel Corp.**, Pittsburgh.

James D. Roberts, appointed superintendent, Jacksonville, Fla., warehouse, **Republic Steel Corp.**, Warehouse Div.

PERSONNEL



ROBERT T. DUNLAP, elected vice president, The American Wire Fabrics Corp., subsidiary of The Colorado Fuel and Iron Corp.



PAUL W. NORRIS, elected vice president and general manager, Denison Engineering Div., American Brake Shoe Co.



DENISON NEALE, named director, sales Denison Engineering Div., American Brake Shoe Co.



ARTHUR D. PATTERSON, elected treasurer, The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

PERSONNEL



RALPH E. BEVIS, named manager, Ceramic Technical Center, Ferro Corp., Cleveland.



KENNETH A. MERZ, appointed asst. chief engineer, Air Impeller Div., The Torrington Manufacturing Co.



CLAYTON K. COLE, named asst. chief engineer, material handling products, Ingersoll Kalamazoo Div., Borg-Warner Corp.



GEORGE A. VISCOMI, named sales manager, Manufacturing Div., The Lees-Bradner Co.

Donald C. Osborne, named asst. general superintendent, rolling and processing, **Armco Steel Corp.**, Middletown, O.; **Robert S. Hayes**, named asst. general superintendent, supervising maintenance and services; **Vernon W. Jones**, appointed asst. general superintendent, blast furnace and steel plant operations, Middletown Works; **John Poast**, named asst. general superintendent, Hamilton plant of the Middletown Works.

Paul Van Wert, named flight operations manager, **Hycon Aerial Surveys, Inc.**, Pasadena, Calif.

Virgil E. Caldwell, Jr., named director, sales and contracts, Manufacturing Div., **Topp Industries, Inc.**, Los Angeles.

Fred Koelble, named staff assistant, Corrosion Engineering Products Dept., **Pennsalt Chemicals**, Philadelphia, Pa.

Arthur J. Buckley, named general sales manager, **Pangborn Corp.**, Hagerstown, Md.

Edwin L. Horsley, named district manager, New York sales office, Rome Manufacturing Co., Division of **Revere Copper and Brass Inc.**

P. W. Morse, appointed general sales manager, **Magnethermic Corp.**, Youngstown, O.

Fred H. Edgar, named industrial sales manager, automotive, **Reynolds Metals Co.**, Detroit.

James Denmark, named St. Louis district sales manager, **De-Walt Inc.**, subsidiary of American Machine & Foundry Co.

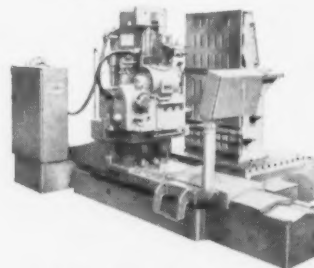
John W. Freund, named western district manager, Metal Products Div., **Koppers Co., Inc.**, Pittsburgh.

Richard G. Frederick, named manager, Baltimore sales branch, **Crucible Steel Co. of America**, Pittsburgh.

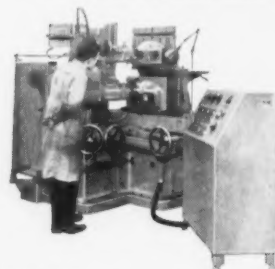
Thomas G. Kuzman, named district manager, sales, Detroit, **Rotary Electric Steel Co.**

(Advertisement)

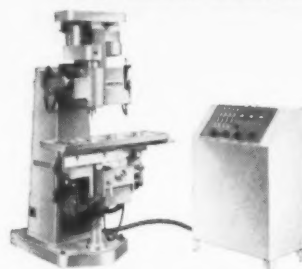
A P&W Tracer-Controlled MILLER FOR EVERY JOB



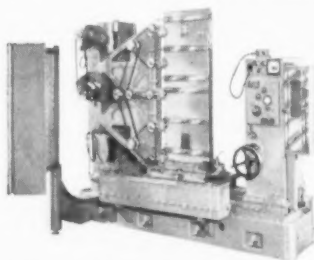
KELLER TYPE BG-21 ... a powerful, versatile machine in a range of sizes from 5' x 2½' to 10' x 4', in single and 2-spindle models.



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To machine the WORLD'S LARGEST DIE, *ALCOA chose the Keller . . .*

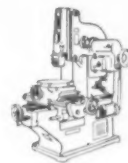
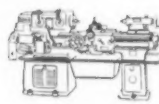
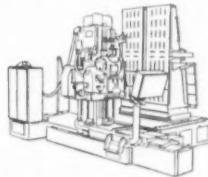
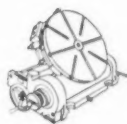
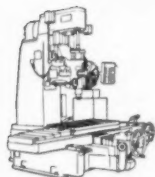
. . . AUTOMATIC TRACER-CONTROLLED MILLING MACHINE

Consisting of two halves, each weighing 30 tons, this is the world's largest closed die block. Designed to forge aluminum backbones of fuselage and wing structures for the new multi-jet Martin SeaMaster, this giant die was produced on a P&W Keller BG-22 at the U.S. Air Force Heavy Press Plant operated by Aluminum Company of America.

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every worksize requirement. Every Keller Machine offers the same important advantages: fast, accurate reproduction of complex 3-dimensional shapes, extreme versatility and an overall ability to produce highest work quality economically. These advantages will also make Keller your first choice for a wide variety of die, mold and other hard-to-handle 2- and 3-dimensional milling jobs. Write now for complete information.

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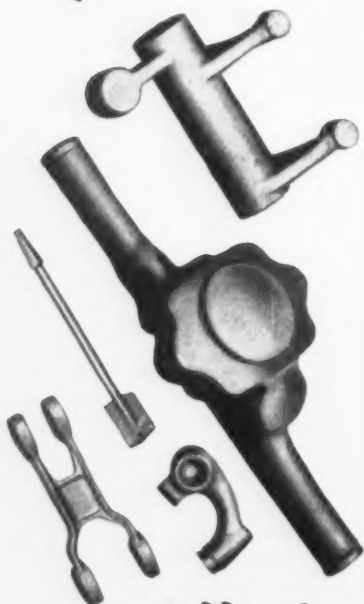


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Harry E. Hogue, named asst. manager, operations, Dearborn Div., **Sharon Steel Corp.**, Dearborn, Mich.

Richard J. Keyser, named consultant, shop operations, **General Electric Co.**, Schenectady, N. Y.

Paul E. O'Hora, named New York district sales manager, **Orr & Sembower, Inc.**, Reading, Pa.

John Zahorjan, named plant manager, Joliet, Ill. plant, **Phillips Control Corp.**

Leslie A. Welge, appointed manager, manufacturing services, **United States Chemical Milling Corp.**, Manhattan Beach, Calif.

Frank E. Hutton, named director, research and development, **Pendleton Tool Industries, Inc.**, Los Angeles.

Andrew D. Hunter, named sales manager, Sheet and Coil Div., **Quaker State Metals Co.**, Lancaster, Pa.

Osborne W. Traylor, appointed Houston district sales engineer, Construction Materials Div., **John A. Roebling's Sons Corp.**

Lindsay L. Lenhart, named sales engineer, **Potter & Brumfield, Inc.**, Chicago office.

Frank W. Springer, named asst. purchasing agent, **Ajax Electric Co.**

Robert V. Guignon, named O.E.M. sales representative, **Gries Reproducer Corp.**, New Rochelle, N. Y.

James DeKoker, named carbide cutting tool sales representative, Metallurgical Products Dept., **General Electric**, Texas area.

PERSONNEL



GEORGE HERRICK, named sales manager, Detroit, **Clearing Machine Corp.**



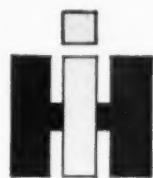
KARL H. FLEISHOUR, appointed superintendent, bloomers and billet mills, **Copperweld Steel Co.**



ROBERT P. MORGAN, named superintendent, 12 and 18-in. mills and the 21 and 24-in. mills, **Copperweld Steel Co.**



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F. X. Gaenger, named marketing manager, atomic energy projects, **Alco Products, Inc.**, Schenectady, N. Y.

Robert E. Jones, appointed manager, meters and contact meter-relays, **Assembly Products, Inc.**, Chesterland, O.

Leward L. Bean, appointed specialist, pricing and procedures, marketing section, Service Shops Dept., **General Electric Co.**

Dr. Roland E. Kreibich, appointed product engineer, Phenolic Products Section, Chemical Materials Dept., **General Electric Co.**, Pittsfield, Mass.

William S. Cook, appointed sales engineer, Dresser Mfg. Div., **Dresser Industries, Inc.**, Bradford, Pa.

L. F. Barnett, named sales engineer, **Lewis M. Crowe Co.**

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William C. Martin, Sr., 57, president, **United Steel Fabricators, Inc.**, Wooster, O.

George Washington Chandler, 73, retired superintendent of mines, **Tennessee Coal & Iron Div.**, U. S. Steel Corp.

N. L. Hite, retired sales manager, Wire Div., **Continental Steel Corp.**, Kokomo, Ind.

Rodwell Todd, secretary and director, **Hanson-Van Winkle-Munning Co.**

Martin L. Ritter, manager, sales, **Farrell-Cheek Steel Co.**, Sandusky, O.



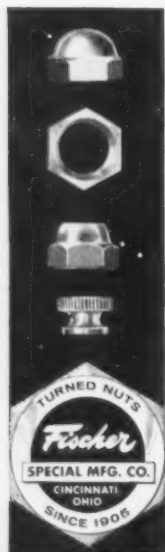
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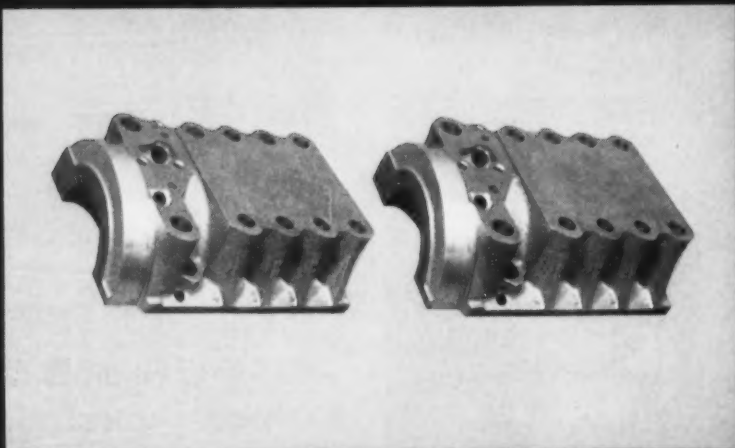
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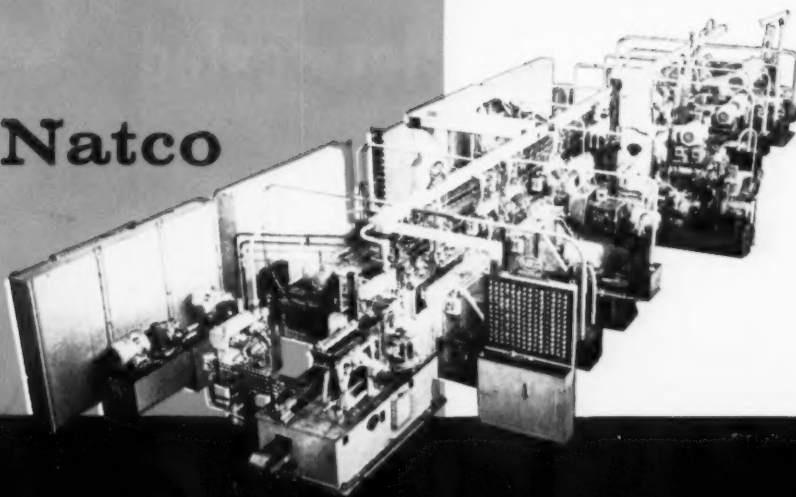
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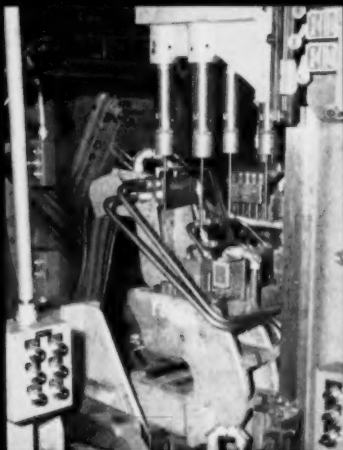
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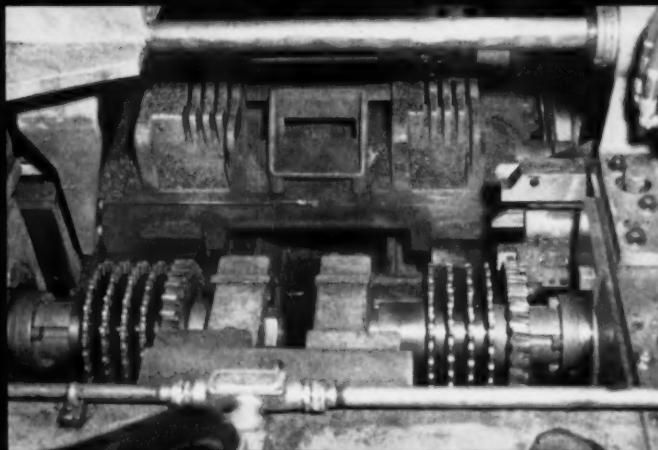


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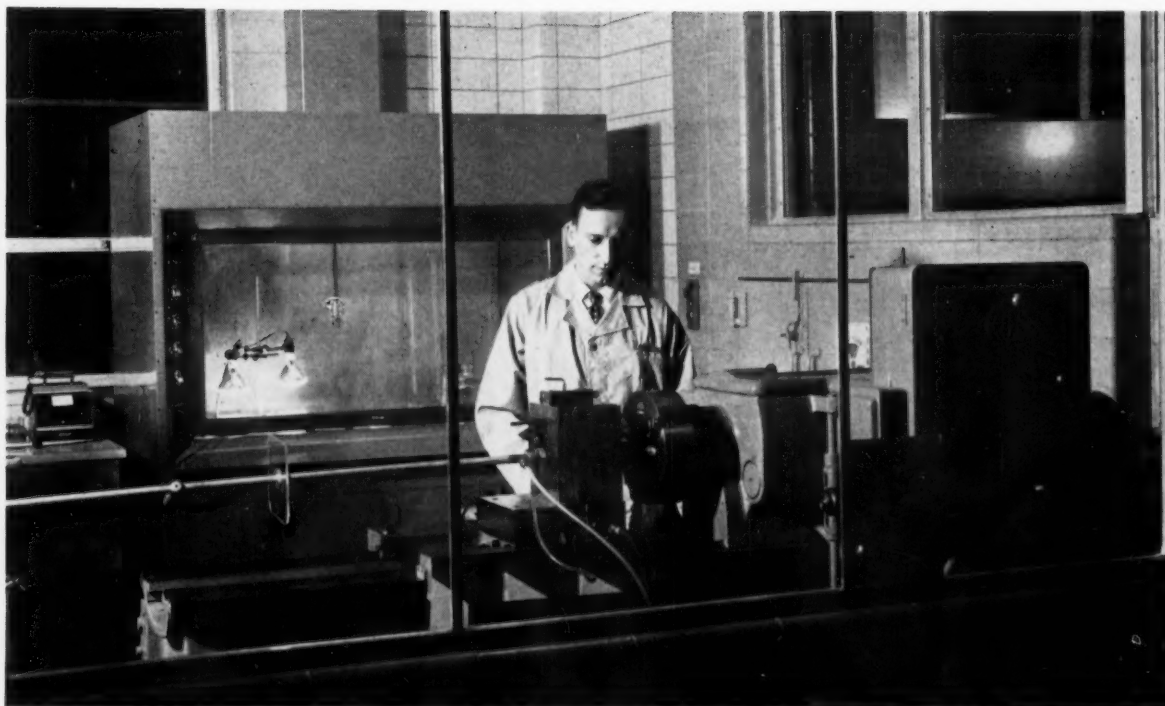
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FEATURE ARTICLES



HOT LAB: Atomic physics provides new and highly accelerated techniques for direct measurement of tool wear at Cincinnati Milling Machine Co. Radioactive tracers serve to measure wear.

Machinability Testing: Science Or Fiction?

By P. M. Unterweiser—Metallurgical Editor



HIGH SPEED: GE tests cemented oxide tool on heavily scaled log.

If you machine metal in any form, you contribute to the 15 million tons of metal chips carted to the scrap yard every year.

Are those chips of yours the by-products of efficient machining? Or does a lot of your money go along with the chips—down the drain?

■ The new science of measuring metal-cutting efficiency is beginning to dry behind the ears. It has, in fact, shed enough water to warrant being called a science.

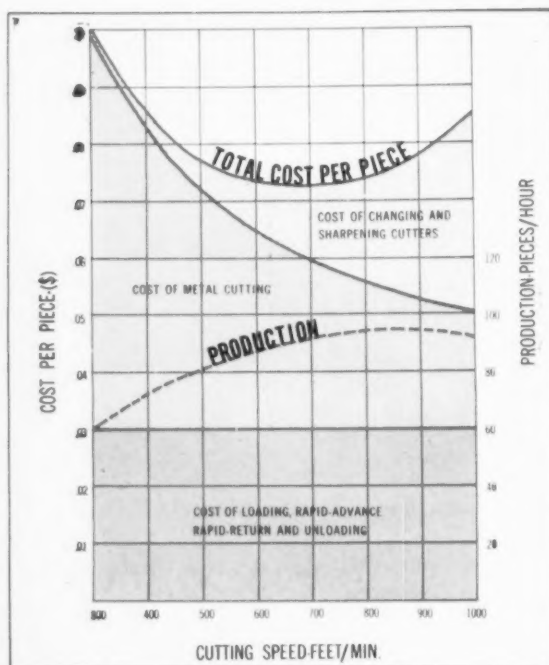
Such is the careful opinion of scientists and engineers closest to the metal-cutting arena. And it

represents a considerable turn-about from the opinions some of these same men held a decade ago.

For machinability testing has come a long way in a relatively short time. For many years, its body of knowledge was as ephemeral as the answers produced by a Ouija board. Its research techniques consisted essentially of claims and counter-claims. The precision of its measurements was either hopelessly crude or nonexistent. It was devoid of science because what it had to offer was neither tested, nor proven, nor reproducible.

Some Skeptics—Even now, not everyone is entirely sold on the

TEST LATHE: Engineer checks machining efficiency at Warner & Swasey.



INCREASING CUTTING SPEED first lowers, then raises, the Total Cost Per Piece, as the rising cost of changing and sharpening cutters overbalances saving in metal cutting time.

validity of machinability testing. There are more than a few skeptics. And though the skeptics may be in retreat, they have not forsaken their doubts.

They will usually concede that the evaluation of machinability is beginning to make "some" sense. But, they say, its status as a science is still suspect—even when its methods of measurement are reasonably scientific.

In their opinion, the science of machinability is comparable to many of our evolving social sciences. These are seldom, if ever, exact. They often lack the element of reproducibility. In terms of machining, this means the ability to transform laboratory findings into workable shop practice.

"Some of machinability measurement must be valid," is the opinion of one engineer. "We can sense that much, just as we can sense that sociology probably has something of importance to say. But so far, no one has settled upon the right language."

Expert View—This, obviously,

is not the view of our present-day machinability experts. They are convinced they've found the language in metallurgy, in physics, in chemistry, and in a clutch of scientific measuring instruments — microscopes, X-ray diffraction units, Geiger counters, analog computers. Without presuming to know all of the answers, they are adamant in their claims to having produced quite a few.

And they have produced useful answers by a variety of means. Some of the means are identical with those commonly used in the research laboratory. Others are more closely associated with machine shop "know how." Often, there is a mixture of the two.

That is why the fact that many advanced scientific measurements have been adapted to machinability can be somewhat misleading. Such measurements are being used: but their use is far from universal. The bulk of metal cutting tests in the U. S. today are still pretty close to the machine shop floor, not at the level of the Institute for Advanced Studies.

This condition may or may not be ideal, depending upon your point of view. But from the strictly practical standpoint, it can be readily justified. It seems to be getting results.

Big Three — Like Gaul, metal cutting research can be roughly divided into three parts. First, there is the "fundamental." This is the scientific approach in its unadulterated form. It is the approach that depends largely upon audioradiographs, the calculus, diffraction measurements, phase change studies, and the manipulations of electronic calculators. Its course is charted by a select few — mostly scientists with highly specialized training.

Then there is the "fundamental-practical" approach. Metallurgically speaking, this is a kind of alloy. It consists of large grains of shop practice and manufacturing experience in a matrix of scientific measurement. When its proportions are in proper balance, it works nicely. But it can sometimes suffer from sheer instability.

Lastly, there is a "practical" approach. While it falls short of scientific stature, it is still the ultimate proving ground for all other measurements.

The "practical" approach is far from barren. Ironically, it continues to be a rich source of new ideas, new methods. It can frequently make things "work"; occasionally, it achieves the impossible.

For the Boss—But whatever it achieves in practice, it can seldom—if ever—supply the kind of answers that please the scientist. Its answers often please the boss, however. And so the "practical" approach is still very much in business.

Among those who test machinability at all, some variation of the "fundamental-practical" approach seems to have the broadest popular appeal. Obviously, there is something reassuring in a method that allows that the game can be played from either end. It is highly flexible, combines the scientific and the practical, and provides features that can be adjusted to virtually every taste and budget.

The purely fundamental approach is usually a lot more expensive to support. Still, it probably harbors the greatest future potential—if you can afford it. By and large, its principal sponsors are machine tool builders and tool steel manufacturers.

These companies offer useful scientific measurement as a service to their customers. They also believe in insuring their future security. And such research constitutes a kind of insurance policy predicated to keep them abreast—if not out in front—of their competitors.

No Choice—Also among the "fundamentalists" are some of the aircraft engine and frame manufacturers and the government arsenals. In a sense, they have little choice in the matter. When you are obliged to machine titanium on one day and zirconium the next, you have to operate scientifically or cease operations.

Unfortunately, many metal-working plants pay little, or no, attention to machinability tests in

any form. Relatively few bother to avail themselves of the valuable metal cutting data offered—even when it is offered without charge. The reasons put forth in an attempt to account for this lack of interest are many and varied. But, at best, they are hard to understand.

How come this complacency? Perhaps it springs from a belief that current machining practices are *apparently* satisfactory. Acceptable parts are being turned out. A tidy profit is being made. There may be an occasional problem, of course. But is that unusual?

Certainly the logic is clear, but its emphasis is unprofitably misplaced. The science of machinability measurements is *not* devoted *exclusively* to solving isolated machining problems. Its chief aim is *efficient* machining. The kind of machining that moves at higher speeds, conserves skills and tool wear, and still provides the acceptable surface finish and the close tolerance.

Thinking Profits—It is the kind of thinking that is likely to turn a tidy profit into an even tidier profit. Or, in an emergency, jack up a potential loss to the "break even" point. It is the kind of thinking that appreciates machining efficiency for what it really is: an almost endless vein of industrial savings.

Here's how Dr. M. E. Merchant of the Cincinnati Milling Machine Co.'s research team explains the situation:

"Every year in the U. S. alone, over 15 million tons of metal are machined into chips at a cost of over 10 billion dollars. With metal cutting playing such a sizable role as this in our economy, the plain dollars-and-cents value of possible improvements to the process are evidently tremendous. . . .

"For example, it is known that the scientific application of metal cutting information already in existence can readily effect savings of from 10 to 50 pct in almost any present-day production machining operation. It is not unreasonable to expect . . . that as additional, improved metal cutting information is obtained and made widely

available, a nation-wide improvement on the order of 10 pct in present-day machining practices may well occur.

"On the basis of the above figure, this would mean an annual saving to the U. S. of 1 billion dollars—no mean trifle in our industrial economy."

The Pay-off—A major part of this saving is likely to derive from knowledge gained in machinability research. At times it will be general; at other times, specific. Ultimately, it is knowledge that must encompass metal cutting in all of its aspects—both obvious and remote. It is knowledge that must include physics, dynamics, mechanics, chemistry, statistical analysis, and metallurgy. Above all, it is knowledge that must make itself felt on the production floor where it can do the most good.

How is this knowledge accumulated? And how is the knowledge already accumulated making itself felt? The answers to these questions are, in many respects, inter-related.

Most advanced knowledge regarding all aspects of machinability is likely to come from a unified scientific approach. In re-

Research Is Now Checking These Points:

1. Can an altered drill geometry improve drilling?
2. What is the difference in wheel wear characteristics when you traverse grind? Plunge grind?
3. How is cutting fluid effectiveness influenced by tool geometry?
4. Does the introduction of direct current energy to a tool actually reduce tool wear?

The science of machinability is aimed directly at extending tool life, making shop machining far more profitable.

search involving cutting tools, tool wear is normally the prime target of investigation. This emphasis stems from the assumption that tool wear is the controlling factor of machining costs—other factors, such as labor and overhead, being equal.

Vital chips—All facets of tool wear, therefore, are carefully scrutinized. Tool geometry is a basic factor, so that the effects of altering tool geometry are systematically recorded. The geometry of chip formation is also highly significant. Fortunately, all phases of chip formation can be analyzed while the chips are being formed. High speed motion picture cameras, shooting at speeds of up to 8,000 frames per second, make such studies possible.

Obviously, the forces and stresses exerted upon the tool during cutting have a lot to do with tool life. These forces are measured and recorded by a strain gage type dynamometer. With the information obtained, it is possible to calculate stresses, frictional characteristics, and heat flow in the chip forming process.

Although coolants are not required for some cutting operations, they are considered absolutely essential for others. They can appreciably affect both heat and friction at the chip-tool interface. But to do the job properly, they must have suitable penetrating, cooling, and lubricating characteristics. Evaluating all of these factors is the job of the physical chemist.

Enter Metallurgy—Metallurgical research is still a highlight of machinability evaluation, but its emphasis has shifted in recent years. Less time is devoted to defining metallurgical structures that are likely to machine easiest. Ten years ago, this was the prevailing fad. The motto then was: choose the right metallurgical structure and your machining problem solves itself.

At the outset, it became fairly

evident that the matter of producing a closely controlled metallurgical structure on a production basis was hardly a dead cinch. Even subtle changes in steel chemistry, for example, were enough to upset the apple-cart.

But the death blow to the structural approach was probably dealt by the introduction of new high-temperature materials. Titanium alloys, the so-called "superalloys" of the stainless family—these and other new materials just couldn't be made to scale the structural hurdle. If they were to be machined, satisfactory answers had to be found. And the search for these answers gradually turned metallurgical research right back to the study of cutting tool performance.

One phase of metallurgical research now receiving a lot of attention is that dealing with inter-metallic diffusion of the work material into the tool, and vice versa. Such diffusion, occurring at the points of contact between tool, work, and chip, directly influences tool life. Diffusion zones are studied in minute detail by means of both the electron microscope and X-ray diffraction and spectrographic units.

Speedy Tracers—Thanks to the progress made in atomic physics, new and highly accelerated techniques are available for the direct measurement of tool wear. Possibly the most important of these is the employment of radioactive tracers capable of measuring wear and describing its basic mechanics. In many instances, radioactive tracers cut wear testing time to about 1/20th of that formerly required by conventional methods.

With proper facilities, the use of radioactive tracers is as simple as it is time-saving. The tool to be tested is first exposed to a radioactive pile until it, in turn, is activated. Then test pieces are machined for a few seconds with the radioactive tool. The resulting chips, containing radioactive par-

ticles from the tool, are collected in a non-metallic container.

Since it is known that the amount of radioactivity present on the chips is directly proportional to the amount of metal abraded from the tool in a given time, the rest of the test is straightforward. All that is required is a quantitative measurement of chip radioactivity. This is made on a continuously recording Geiger counters.

Not for Ceramics—Unfortunately, this amazing test cannot be applied to the ceramic aluminum oxide tools. It isn't the test's fault, however. It is simply that aluminum oxide does not produce useful radioisotopes under neutron bombardment. Consequently wear tests on some newer ceramics are likely to be long-winded.

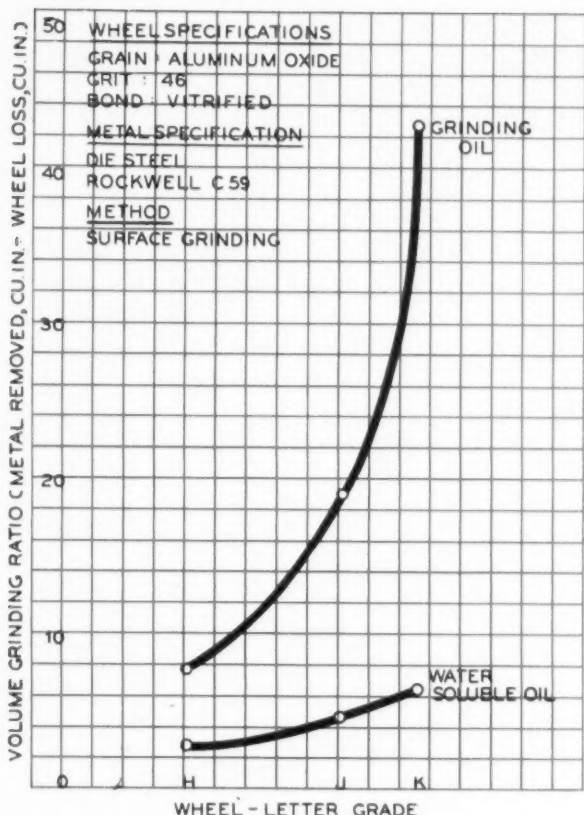
These are some of the trends in metal cutting research, trends that have systematically transformed the fictions and guesswork of machinability into the new science we know today. However academic the approach, the science of machinability is aimed directly at making shop machining operations easier, more profitable.

The objectives of machinability research are vital to our national defense as well—not only because they help to speed the production of armament—but also because they are tackling the tough machining problems posed by the "materials of the future."

Acknowledgment—The editors would like to acknowledge the assistance offered by the many engineers, research scientists, and manufacturing personnel interviewed in connection with the preparation of this article. Also, they want to thank the following companies for their cooperation in helping to make this feature possible: The Cincinnati Milling Machine Co., The Warner & Swasey Co. and Metallurgical Products Dept., General Electric Co.

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FIG. 1



There's no doubt that grinding fluids and how they're used affect wheel performance.

Question: Which fluids and methods have the most influence, where and how much?

Here's how gases, water soluble oils and straight oils check out when it comes to surface, cylindrical and tool grinding.

Grinding fluids play an important part in the grinding process. To the degree that they affect grinding wheel performance, they also affect the factors that control production rate, quality of the ground part, dimensional accuracy, and—most of all—grinding costs. Moreover, the different methods of applying grinding fluids also affect the same vital factors.

The question, for both fluids and application methods, is: How much?

To find the answers, the Carborundum Co. tested 76 different

grinding fluids in a variety of grinding machines, under numerous conditions. The fluids included gases, water emulsions (both paste and oil types), and grinding oils.

In all, the test series measured five factors to gage the effect that these general classes of fluids had on grinding wheel performance. The factors were: (1) amount of metal removed, (2) wheel wear, (3) power consumed, (4) work-piece finish, (5) cutting rate.

Fringe Benefits—Fluid ingredients designed to produce specific effects on odor, color, antiseptic properties, emulsion stability, anti-rust qualities and the like were not measured in themselves. They could only be evaluated in terms of overall, or fluid-class effect on the foregoing five factors. Admittedly, changes in proportions of these ingredients could alter the manner in which individual fluids affect wheel performance.

All test conditions were ideal; fluids were freshly mixed and used in clean tanks on clean machines.

How Much Do Grinding Fluids Affect Wheel Performance?

By J. A. Mueller—Manager, Bonded Abrasives Grinding Lab., The Carborundum Co., Niagara Falls, N. Y.

Part I

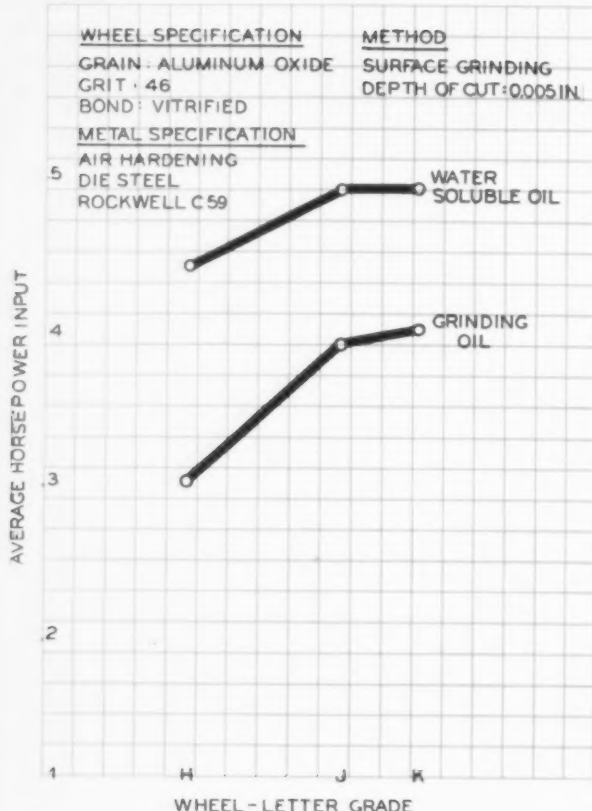
Fig. 1 shows the relative performance of grinding oils and water soluble oils in precision surface grinding on air-hardening die steel. The curves are composites of tests made on three grinding oils and 73 water soluble types. They point out the effect of these fluids on the grinding ratio, covering a range of wheel-hardness grades in the 46-grit size which is popular in surface grinding.

Primarily, grinding ratio is the ratio of metal removed to wheel loss. It is also a measure of: (1) pieces ground per wheel dressing; (2) ability of the wheel to hold form, generate dimensional flatness and remove stock; (3) the total amount of stock that a wheel can remove.

Fig. 1 also shows that grinding

This is part one of a two-part series. The second article, which deals with the effect of grinding fluid application methods on wheel performance, will appear in the March 7 issue.

FIG. 2



oil produced an increase in grinding ratio ranging from 140 pct with the softer (H) wheel to 520 pct with the harder (K) wheel. Grinding oil produced similar increases in grinding ratios when it was used with 80 and 150-grit wheels on the same material.

Oil Is Tops—On this type of die steel it is apparent that grinding oil compared to water soluble oil will: (1) maintain wheel form much longer, (2) remove more metal per unit of wheel, (3) permit grinding larger areas without wheel breakdown, (4) reduce the total amount of abrasive used.

Other surface grinding tests, again made with grinding oil and water soluble oils, measured the deepest cut that could be taken on the die steel without a complete wheel breakdown. Wheels used were 46 grit and 80 grit. For both grit sizes, grinding oil permitted substantially heavier cuts than water soluble fluids.

Also, an 80 grit wheel used with oil took a heavier cut than a 46 grit wheel used with a water sol-

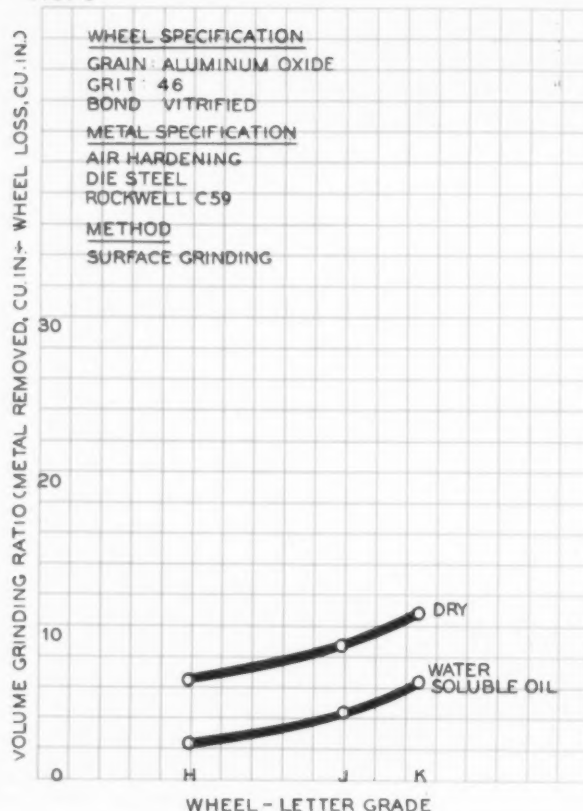
uble fluid. This means that oil permits the use of finer grit wheels and the production of finer finishes.

Less Power—Surface grinding tests on power consumption also compared straight oils with water soluble types. They showed (as in Fig. 2) that the grinding oil reduces total friction between wheel and work to make the wheel cut more freely.

To evaluate fluid effects in surface grinding more completely, further comparisons between grinding oils and water soluble oils were made on a number of commonly used tool steels. As in previous tests, grinding oils produced higher grinding ratios. Such oils also reduced surface roughness to a greater extent. They had a superior effect on visible burn marks, also; either minimizing or eliminating them.

The relationship between oil and water soluble fluids, as demonstrated in these surface grinding tests, extends to other areas

FIG. 3



of grinding, also. For example, it is universal practice to use oil in thread grinding operations to maintain dimensional accuracy and to prevent wheel breakdown.

But although grinding oil is used with great success, it may require special handling, adequate controls and proper setups.

Seek Ideal—Would the ideal grinding fluid have all the advantages of a straight oil and yet be as workable as a water soluble type? Water soluble oils in heavier concentration do improve grinding ratios, form-holding ability of wheels and workpiece finishes. But other Carborundum tests on tool steel and 302 stainless indicate that even very heavy (1:10) concentrations will not equal or approach the effects produced by a grinding oil.

Another widely used grinding fluid is the atmosphere, applied to dry grinding on surface grinders and cutter grinders. How does dry surface grinding compare with wet (water soluble oil) operations over a range of wheel gradings?

FIG. 4

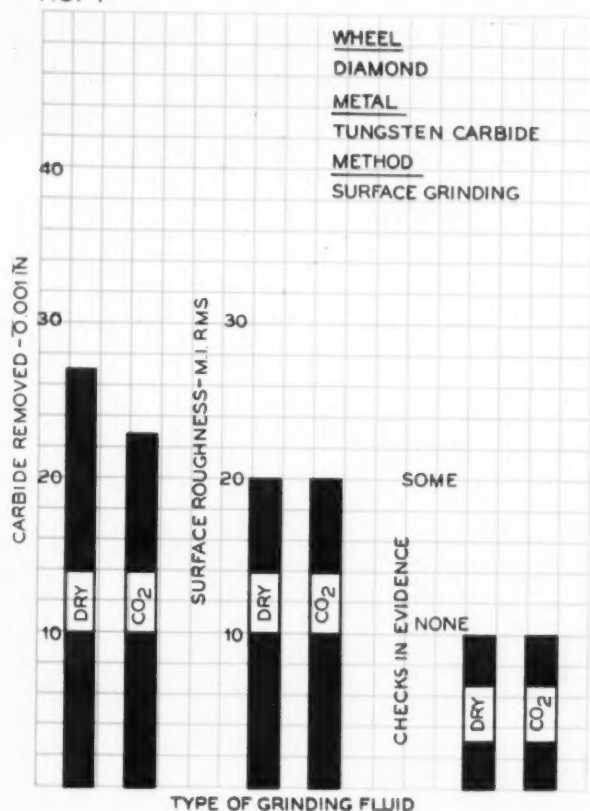


FIG. 5

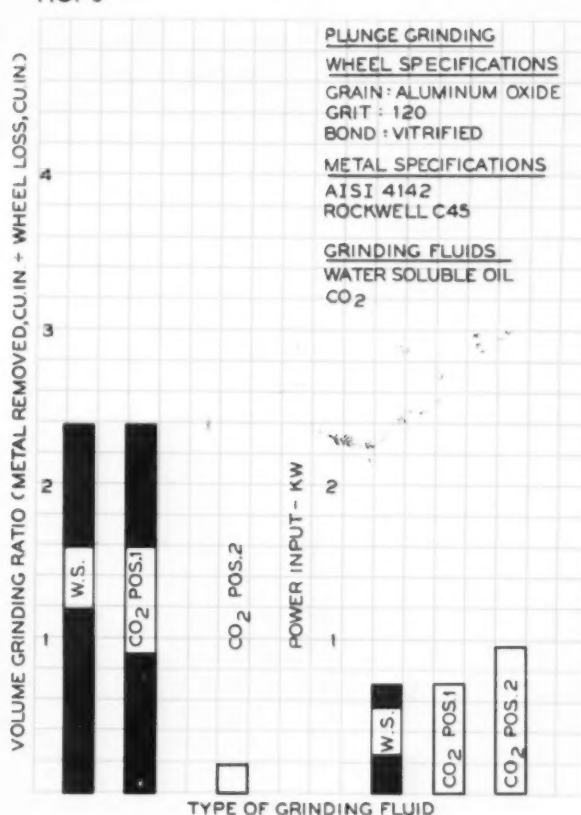


Fig. 3 tells the grinding-ratio story on the air hardening die steel: dry grinding holds wheel form better, removes more metal per unit of wheel and is uniformly more efficient than wet grinding. It also shows that for wet grinding to produce the same grinding ratio that is produced by dry grinding, a wheel two to three grades harder must be used. One wheel will not perform wet and dry with the same efficiency.

Need Fluids—Test data would indicate that dry grinding could replace the wet method and result in a more efficient and satisfactory grind. But industrial practice has long since proved that wet grinding is absolutely essential in many cases.

On metal cutoff operations, both resinoid and rubber bonded wheels act harder when they are used wet. For the same number of cuts, made at the same rate of cut, wet-wheel loss is about half as much as the loss from a dry wheel. Here again, one wheel cannot be ex-

pected to perform as well when it is dry as it does when wet.

Checks CO₂ "Snow"—The tests concluded with a series to check the effect of a stream of CO₂ "snow" on wheel performance.

Fig. 4 shows the result of a test in which tungsten carbide was surface ground with a diamond wheel. Grinding was done dry in one case and with CO₂ cooling in another. The dry method removed slightly more carbide. Surface finish was about the same in both cases, and neither method caused any checking of the carbide tools. For this operation, CO₂ does not seem to be necessary.

Another test compared CO₂ and dry methods for surface grinding tungsten carbide with conventional silicon carbide wheels. This type of wheel was chosen deliberately so that by grinding dry, it would check the carbide tools. But CO₂ offered no relief from checking. Nor did it remove any more carbide or refine the finish any better than the dry wheel.

The next test—grinding single

point carbide tools—compared the finish produced by silicon carbide vitrified wheels (with and without CO₂ cooling) with those produced by a dry diamond wheel. The diamond wheel produced a 10 microinch finish; the silicon carbide wheel produced a 20 microinch finish when used dry, and also when used with CO₂ cooling.

Another test series showed that in cutting off C1020 steel, water soluble fluid was marginally superior to CO₂; it generated a better finish and produced more cuts per square inch of abrasive used.

Fig. 5 compares CO₂ with a water soluble fluid in plunge grinding AISI 4142 steel. Two bars represent the CO₂ effect: Bar 1 when the stream was directed on the work at a slight distance from the point of wheel contact; Bar 2 when the CO₂ was aimed directly between the wheel and the work.

The spread between the grinding ratios indicates how critical the position of the CO₂ stream is in plunge grinding.



TWIN LINES: Work moves mechanically through carburizing portion of salt bath lines; manually thereafter.

Carburize, Martemper Parts in Single-Line Setup

By C. E. Kopp—Factory Manager, Evinrude Motors, Milwaukee

Keep up with your competition. That's the lower threshold of survival on today's rough-and-ready competitive scene.

Better still, outfox 'em. Modernize your productive facilities with tomorrow's, as well as today's, needs in mind.

Here's how one plant has put its heat-treating house in order.

■ Competing successfully in today's rough-and-ready metalworking markets implies that you've been pretty good at anticipating tomorrow's needs, as well as accommodating to today's. The degree to which your productive capacity lags—or leads—your customers' requirements is one pretty

good measurement of your success.

Or you can turn the thing around. Most successful companies—assuming a competitive situation—probably have a production setup which pretty well mirrors their market needs.

With maybe just a bit extra, to grow on.

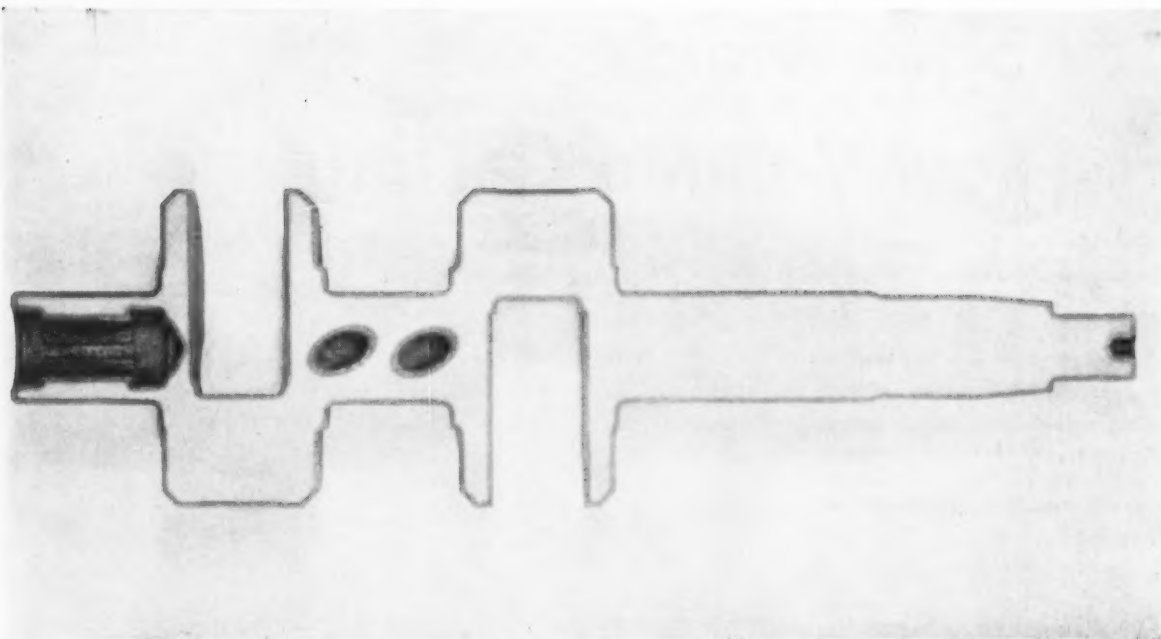
Latest Step—Evinrude Motors Div., Milwaukee, recently installed a mechanized salt bath line for the combination carburizing and martempering of outboard motor crankshafts. This as a latest step in a carefully reasoned plant modernization program begun in 1945. Heat-treat facilities were then pinched. But the anticipated demand for outboard motors in years ahead—bottled up during World War II—made modern, expandable heat-treat facilities a must.

First line installed was a first in several ways. It was unique in that it was the initial line in the country to combine carburizing and mortempering on a production basis.

Adds Toughness — Ajax Electric Co., in Philadelphia, designed and built it. The martempering step was included at Ajax' suggestion. Purpose was to give the crankshafts added toughness. At the same time, martempering reduced the chance of distortion and cracking and minimized machining after heat treatment. It proved so successful that four similar lines have since been added.

Latest, just installed, handles 700 gross pounds of work an hour. The line includes six units, in all.

These consist of a 360 kw electrode-type Ajax carburizing bath



CUTAWAY VIEW: Macroetched cross-section of crankshaft shows uniformity, thickness of carburized case.

with working dimensions of 178 x 32 x 30-in. salt depth; an 80 kw neutral salt bath, with working dimensions of 12 x 30 x 32-in. salt depth; a martempering quench, employing resistance-type heaters immersed in the salt and heating it directly, and a 30 kw draw furnace, with working dimensions of 52 x 32 x 30-in. salt depth.

A wash and rinse tank and a push-pull handling mechanism complete the arrangement.

How It Works—The push-pull mechanism consists of two parallel beams with reciprocating, push-pull bars and dogs. These extend the length of the carburizing furnace, one beam on each side. Hydraulic cylinders or a crank and lever system, driven by a speed reducer, move the push-pull bars. The bars carry the dogs, which are normally arranged to advance the fixtures at the center of the furnace only a part of the stroke, while end fixtures advance through the full stroke.

This arrangement results in closer spacing of the work at the center of the furnace and wider spacing at the ends. Thus introduction and removal of the work is easier.

Shorter Furnace—The push-pull mechanism has another advantage. It permits the use of a considerably shorter furnace. Consequently, floor space is saved and heat losses are proportionately less. This in turn reduces the kw of connected load. Less salt is required, too, further cutting operating expenses.

Evinrude now uses crankshafts drop-forged from SAE 4615 or SAE 8617 steel; will soon switch over to shell-molding them instead. These are made in various sizes for the different horsepower motors. Before heat-treatment, shafts are turned, milled, broached, ground and thoroughly cleaned in a vapor degreaser. Two sizes are treated in the newest carburizing-martempering line.

The Sequence—Typical heat-treatment consists of:

- (1) Carburizing in a suitable cyanide-activated carburizing salt to approximately 0.045 to 0.060 in. case depth at 1700°F. Cycle runs 4½ to 6½ hours.
- (2) Air-cooling for 8 to 16 minutes depending on carburizing cycle.
- (3) Reheating in neutral salt bath at 1500°F for a period of from 5 to 10 minutes.

(4) Martempering at 400°F for 4 to 5 minutes, with mixer agitation and at least 1 pct water.

(5) Air-cooling to room temperature.

(6) Drawing at 300°F for 30 to 45 minutes.

(7) Water wash.

(8) Hot water rinse.

(9) Unloading.

After heat treatment, a minimum of anywhere from 0.007 to as high as 0.012 in. of stock on the diameter is removed by grinding.

Meets Specs—Hardness after grinding meets specifications, averaging about Rc 62 with a range of Rc 61-63. Tolerances on shafts are held within 0.005 in. total indicator reading as taken on centers.

Evinrude believes its present practice of carburizing, air cooling and reheating is a highly desirable treatment, as it minimizes retained austenite in the carburized case. Other advantages of the salt bath process include uniform carburization of all surfaces with assured penetration, close temperature control, and a substantial decrease in distortion.

This minimizes straightening problems which arose with former atmosphere-type furnaces.

Try Shell Molds For Low Volume Casting

By Samuel Freedman—President, Chemalloy Electronics Corp., Santee, Calif.

Can you show a profit casting as few as 1600 parts in shell molds? And still keep prices competitive?

Many founders might say no. High tooling costs soak up profits fast in low volume shell mold casting.

But tooling costs for short runs mount up with other methods, too. Here are cases where shell casting proved best.

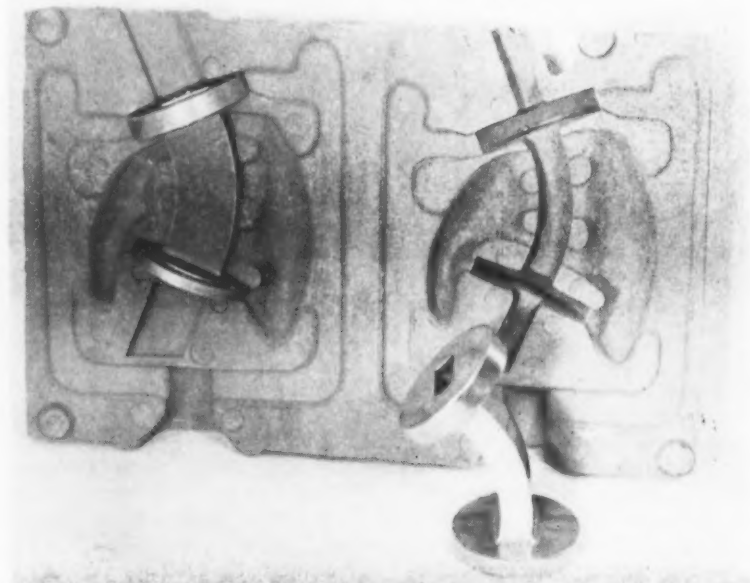
■ Shell mold casting is generally thought of as a mass production technique. But at times it's the best way to handle short run jobs as well. Whether or not this holds true for you will depend on the circumstances.

In low volume casting, tooling costs can be spread out over only relatively few parts. This means each part must carry a heavier burden of tooling costs than normal. With casting output in the high hundreds or low thousands, tooling and shell mold pattern costs will perhaps account for more than half the total production cost of each part. Your bookkeeper will talk here of the need for fast amortization, or writing off tooling costs at a high rate.

Normally it's wise to steer clear of such a situation. It has the sound of an inefficient setup, and can be financially dangerous into the bargain. But where other production methods are slow, complex or costly, shell mold casting may be your best bet on short runs.

Take aluminum waveguides, for example. Can they be successfully shell cast at low cost?

Curved Waves—Waveguides are hollow bars of rectangular cross



CAST AT HALF THE COST: Two lots of 1600 parts each are cast in shell molds made from one metal pattern. Inside tolerances of 0.003 in. and uniform as-cast finish result in good part performance.

section. They are widely used in radar work to direct high-frequency waves from one place to another. This sometimes means around corners and curves. The idea is to do this without losing strength of the UHF signal.

To keep energy loss low requires good basic design, plus (1) inside tolerances of $\pm 0.002 \pm 0.005$ in. per inch of length, (2) little distortion or misalignment, (3) low contamination of the material, (4) smooth internal surfaces (a mirror finish is common), and (5) few if any joints or discontinuities.

Waveguides come in hundreds of sizes and shapes. Each has its own set of performance specifications. In addition, you rarely need more than a few thousand parts of any one design.

Save Money—So waveguides often are electroformed, investment or centrifugally cast, or braze-fabricated. Already you are talking about parts costing from ten to several hundred dollars each. Against such competition, shell castings may sometimes prove less costly.

One shell casting job called for two lots of 1600 waveguide elbows each. The two designs comprised a short section of rectangular tubing bent through 45°, and flanged at each end.

Electroformed waveguides are possible. If tooling is good, the result is a smooth-surfaced part with superior electrical properties. But electroforming is the most costly and slowest method of production.

Extrude Piping—Brazed or soldered waveguides most often use extrusions for the rectangular body of the part. It's possible to get extruded sections that meet tolerance needs. Where dies already exist, cost of the extruded part can be reasonable. With special shapes, however, you must add the price of the extrusion die to the over-all costs of making the waveguide. And many waveguides are special.

Although cost can be a factor with brazed or soldered waveguides, the real drawback is distortion. Prior to joining, the rectangular extrusion may be bent. In bending, the tubing distorts somewhat. This slight distortion is frequently too much for waveguide service to endure.

In joining flanges to the extruded tubing, braze or solder heat further distorts the waveguide. Metal-to-metal adhesives have drawbacks for this service.

Many Joints—The same points apply to another job considered for shell casting: a tapered waveguide. Previously the tapered waveguide was brazed in 14 steps. This meant 14 points of electrical loss and physical mismatch.

As cast in shell molds, the tapered waveguide sells for half the price of its brazed predecessor. Note from the illustration that the cast waveguide is shorter. This because it is electrically better.

Standard technique is used in preparing the shell molds. A metal pattern is attached to a flat, heavy metal plate. This in turn is hinged to an invertable dump box.

Hot Pattern—An electric oven slides over the exposed metal pattern, and preheats it to about 600°F. The oven slides back, and the heated metal pattern clamps to the dump box.

The dump box is inverted for a few seconds, and the sand-resin mix falls on the hot metal pattern. Clay-free Nevada sand is used of about 130 mesh. Resin content is 3 to 4 pct.

Pattern heat causes the resin to melt and bond the sand. This makes a faithful impression of the metal pattern face.

Shell thickness depends on how long the dump box stays inverted.

The longer the time, and the hotter the pattern, the thicker is the shell. A thin shell proved best here. It permits easy escape of gases from the molten metal.

Bake Shell—After again inverting the dump box, the electric oven slides back over the pattern plate with its clinging shell. The shell is baked until solid. Pattern ejector pins lift the shell for easy removal.

A pair of shells are clamped together with a core piece inside. Metal poured into the shells solidifies in a few moments. Production averages one waveguide every few minutes per piece of equipment.

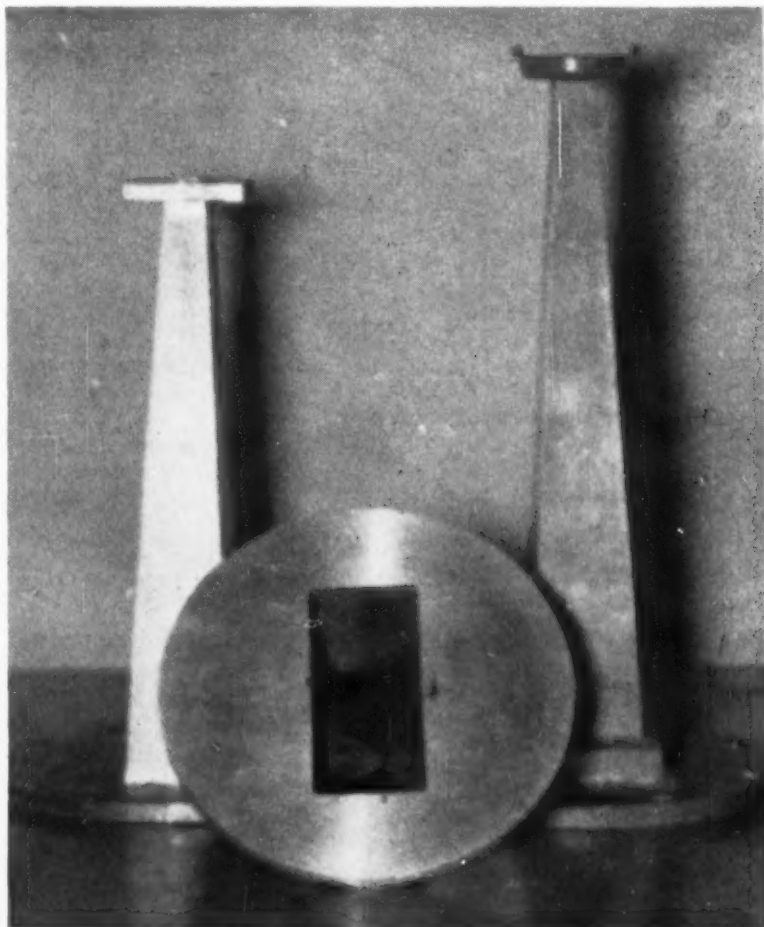
Problems were few and were resolved.

The core piece gave trouble. To achieve the smoothest cast surface, cores first were baked. They did not crumble and proved near

impossible to extract. Switching resins and cutting the resin content cleared up the difficulty.

More Gating—Initially, parts would not fully form in the mold, and showed shrinkage indentations. Extra gating solved this. As now cast, volume of gating metal runs four times greater than that for the part. Gating metal is re-used.

Metal quality is superior. The porous shell allows ready escape of hot gases emitted by the molten metal in freezing. The insulating effect of the shell permits pouring at 200°F lower than normal for aluminum. This reduces metal agitation, gas pockets and internal voids. Waveguides cast in shell molds met and exceeded all specifications. None were rejected after customer test. The slightly rough, as-cast internal finish proved acceptable.



NO MORE JOINTS: Cast part (left) is shorter, and electrically superior. Brazed part (right) had 14 joints.

Forge Welding Joins Heat Treated Aluminum Alloys

Weld heat destroys wanted properties in heat treatable aluminum alloys. Even a post-weld heat treatment doesn't always restore them.

But still you need the light, high-strength structurals that heat treatable alloys make possible.

With high strength aluminum alloys, a new welding process may be your answer.

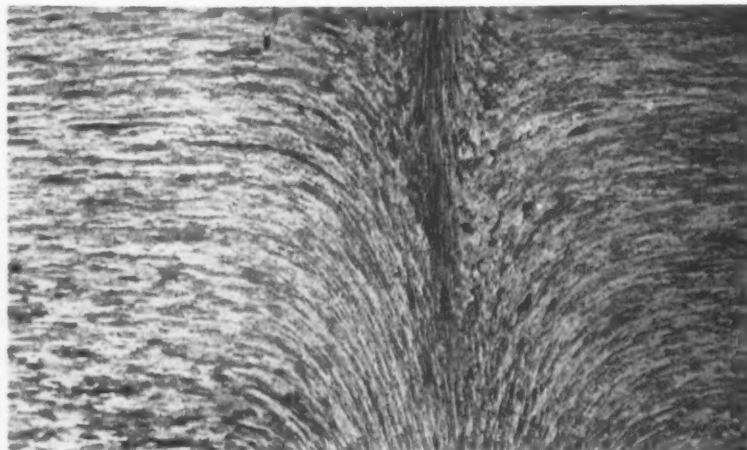
■ The product you're making may call for a high-strength, heat-treatable aluminum alloy. Otherwise, the part won't stand up—and redesign is out. Yet, you're concerned about welding it without destroying the very properties for which you selected it. If so, there's a new twist to pressure welding that merits a check.

The process was developed specifically to join heat treatable aluminum alloys. It also holds promise for welding other nonferrous metals. These include magnesium, molybdenum, titanium and zirconium alloys, according to Ravens-Metal Products, Inc., Parkersburg, W. Va. Ravens-Metal developed the patented technique, and named it Alforge welding.

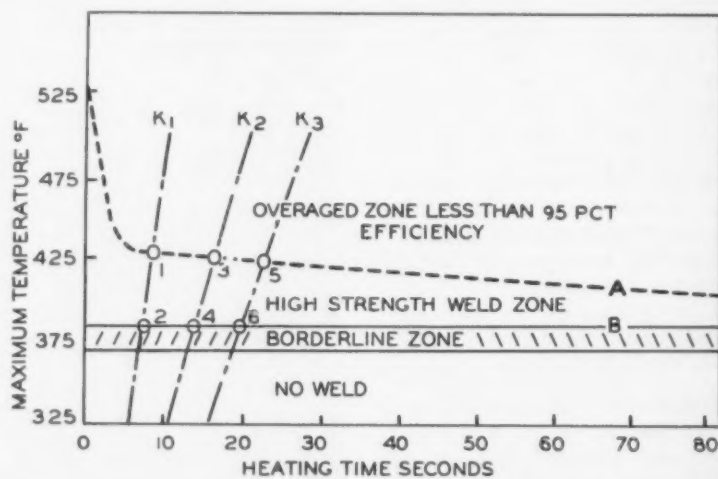
Control Heat—Forge welding is not just plain pressure welding. It differs in several ways: (1) You use a closely controlled heat-time cycle. The cycle varies somewhat with each alloy and its heat-treated state. (2) Aluminum parts weld at 350°-500°F. This rather than at room temperature, or in the 800°-1000°F range, as with standard pressure welding processes. (3) Weld pressures run up to 300,000 psi.

What do you get from forge welding?

First, alloys can be joined in the heat treated condition. This can mean a lot to those lacking the



STRONG JOINTS: Flow lines and lack of original interface indicate completeness of forge-welded fusion. Lack of inclusions or dendritic structure help improve joint strength. (10x)



HOW TO WELD: In joining 7075-T6 aluminum alloy, keep below line A and above line B. Lines A and B converge at right, indicating faster heating rates are preferred.

complex heat treatment setups that high-strength, nonferrous alloys sometimes demand.

You can also forge weld, then heat treat the material. Results are the same, although not quite so dramatic.

Welds Thick Plate—Second, forge welding will join thick as well as thin metal. Joints up to 1 in.

thick are past history. Seam welds and other butt joints are practical. Almost any structural shape can be welded.

Third, the process lends itself to high-speed mass production. Joint cost in large volume work is relatively low.

Fourth, properties of the forge welded joint closely approach

those of the parent metal. The weld contains only wrought, ductile metal. Hardness surveys across the joint show only a slight drop in hardness at the weld. Corrosion resistance of the joint at least equals that of flash butt welded joints. The same applies to fatigue properties.

Get Strong Joints—Table I shows joint efficiency. Note all three alloys already are heat treated. One has undergone solution heat treatment and natural aging (-T4 condition). The other two are in the -T6 condition (solution heat treated and artificially aged). Data on forge welded 2017-T4 aluminum alloy are similar.

The reason for all this concern about joining heat treatable aluminum alloys goes back to weld heat.

Temperatures in conventional aluminum welding processes run high, above the metal or alloy melting point. A cast joint structure results. This dendritic weld metal is both weaker and more brittle than the parent metal.

Watch Over-aging—Then too, weld heat produces a heat-affected zone adjacent to the joint. This partially-annealed or over-aged zone has largely lost the highly desired parent metal properties.

So in welding heat treatable alloys, you have two goals, working at cross purposes.

First, you want complete joint fusion without weld cracking. In pressure welding, this requires ductility of the materials being joined. In their high-strength condition, the heat-treatable alloys show little ductility.

No Arc Welding—Second, you want to avoid heat that will destroy the high strength of the alloy near the joint. That makes torch or arc welding near impossible.

You can approach a solution in two ways. First, avoid heat in welding and let pressure alone fuse the joint. Second, control the heat-time cycle to reduce, perhaps eliminate, ill effects from weld heat.

Room temperature pressure welding works well with some high-strength aluminum alloys in the annealed state. But efforts to

Table I

Typical Properties of Forge-Welded Joints

Aluminum alloy and temper	Tensile strength, psi	Yield strength, psi	Pct elongation in 2 in.	Pct joint efficiency
2014-T6	66,000	58,000	5.5	98
2024-T4	65,000	45,000	8	97.5
7075-T6	78,800	69,000	6	100

Test specimen: 3/4 in. diam barstock

pressure weld these same alloys at room temperature in the fully heat treated state have proved futile. Low ductility, brittleness, weld cracking and poor flow characteristics result. Even if such welds are obtained, and are later heat treated, joint efficiency and ductility remain low.

Too Much Heat—Equally strong objections apply to weld heats of 800° - 1000°F. Such temperatures leave the heat treatable parent metal annealed or over-aged.

Now the idea behind forge welding becomes a bit clearer. You heat just hot enough to get metal flow for a good weld without cracking. But keep temperature low to avoid over-aging. You forge weld in the temperature band between these two points.

The accompanying graph shows the joining range of 7075-T6 aluminum alloy. The part is rapidly heated within the forge-weld zone. Pressure is applied and the weld made. A similar graph can be compiled for each alloy being forge welded.

Keep High Strength—Note from the slope of the A in the figure that any temperature over 325°F will eventually over-age the alloy. This is where controlling the time cycle comes in.

In production work, heating rate K_2 is most practical. While K_1 is better, you risk overheating, particularly at part edges. Longer heating rates (see line K_3) will work; but weld temperature must come down, so higher upset pressures are needed.

Cut Weld Heat—If strength in the joint can run lower than the parent metal, you will want to

modify the process slightly. By raising welding temperature about 50°F, upset pressure can be substantially cut. Joint efficiencies of 90 to 95 pct result.

The forging upset tends to cold work the joint metal. This strengthens the weld area, and explains joint efficiencies in some cases up to 103 pct. In several tensile tests, samples fractured outside the weld area. Grain structure of the weld metal fracture and the unwelded control specimen fracture closely resemble one another.

The process of forge welding is relatively simple.

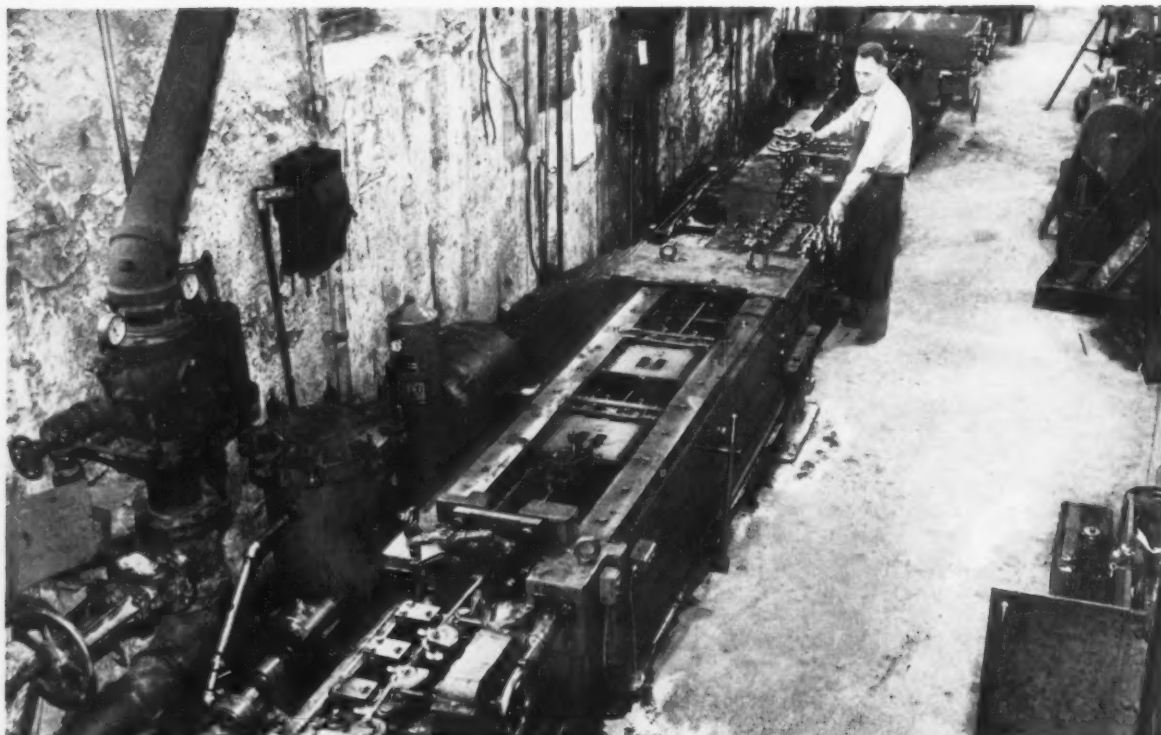
Step - By - Step—First, prepare the mating surfaces by light filing, degreasing and wire brushing.

Then place the parts in dies and apply light pressure. The amount of material projecting from the die face determines the extent of forge upset and the weld quality.

Projecting ends then heat rapidly to welding temperature. Usually this takes less than 30 seconds. Oxyacetylene or natural gas flames do a good heating job. Weld temperature should run between 350°-500°F, depending on the alloy, strength required and cycle.

Wrought Metal Joint—Apply final upset pressure on reaching weld temperature. Heated ends ooze uniformly from the joint interface, causing a flash of metal and completing the weld.

Pressure needed for a good weld varies with die design, weld temperature and desired joint strength. In suitable dies, a 150-ton force will give 100 pct joint efficiency with 7075-T6 aluminum alloy joints. Lower pressures will also weld. But then you must go to higher temperatures.



EASILY-CONTROLLED: Operator regulates vertical, horizontal straightening by simple wheel adjustments.

Draw, Polish Bar in One Machine

By J. H. Glose—Vice President, Operations, Keystone Drawn Steel Co., Spring City, Pa.

Most mills cold-draw and straighten steel bars separately; accept the resulting surface without added polishing.

But as quality requirements climb, a combined machine may come more to the fore.

It cold-draws, cuts off, straightens bar—throws in polishing as a cost-free extra.

■ Perfectly straight, more highly concentric steel bars are being turned out by a machine which cold draws, cuts to length, straightens, and highly polishes steel bars from coiled rods. This completely automatic machine is believed the first in this country installed expressly for steel bar products.

Keystone Drawn Steel Company, Spring City, Pa., installed the machine last June. It produces cold finished rounds, squares, hexagons and flats in sizes from 3/16 to 1/2 in. Lengths run 12 and 20 ft, or 24 ft if necessary.

The machine is a "Schumag," made by Schumacher Metallwerke AG., in Aachen, Germany. American Laubscher Corp. are distributors here.

Polishing's An Extra—Conventional American setups provide separate units for drawing and straightening bar stock. Polishing requires an additional operation. Keystone believes the Schumag's built-in polishing action produces a superior product which becomes increasingly important as customers tend to become increasingly quality-conscious.

Based on operations to date, the following advantages of the new combined unit can be cited:

(1) Bar is straighter. (2) Finish is 3 to 4 times better—now checks out to the equivalent of about 20 to 35 microinches rms. (3) Concentricity is improved, holds within 0.0005 in. (4) Die life runs 20 pct better. (5) Operator output is doubled.

Beside Older Setup—The company installed the equipment next to a conventional setup consisting of a drawing block unit and a separate straightener. The new installation, including the spindle from which the hot-rolled, coiled rod feeds, takes up about 105 ft. in length and 6 ft. in width at its widest point.

This is somewhat more floor space than the other setup requires

Advantages Appear In:

Straighter bar

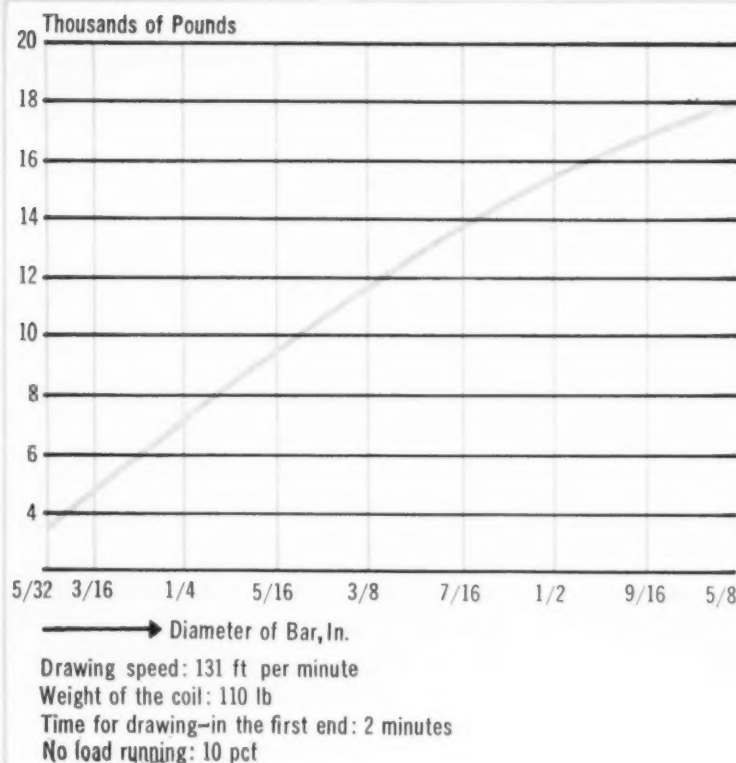
**Better finish (20 to 35
microinch equivalent)**

**Concentricity falls
within 0.025 in.**

Die life up 20 pct

Doubled operator output

RIGHT: Chart shows output capacity of the four-in-one machine over an eight-hour period. Other-sized equipments can handle ferrous bars from 0.078-in. to (with largest machine) 1.260 in. diam.



but the gain in product quality at no extra equipment cost more than justifies the extra floor space. Thus far, the company has made little attempt to emphasize the fact that customers get a superior finish at the same cost. It plans to push this feature more in future.

Pickle First—Hot rolled rods are received from the mills in 300 to 1200 lb. coils. First step is to pickle in a 6 pct hot sulphuric acid solution, held at 165° F. for 20 minutes. This removes any scale or oxide. The coil then gets a lime coating before being moved on for drawing.

It then goes through the following sequence:

First, it's pointed and swaged. The pointed end of the rod then feeds into the first (drawing) stage of the "Schumag" machine. Here, preliminary straightening rollers give it some initial straightening before it enters the tungsten carbide drawing die. The rollers are motor driven, and by pre-straightening, largely eliminate

the stress of the coil so the rod moves straight into the die.

Reduction Varies—Material drawn through the die is reduced either 1/32 in. (for 9/32 in. stock and smaller) or 1/16 in. for the larger sizes. Two cam-actuated reciprocating drawing carriages draw it through the die evenly and continuously, alternately seizing the stock. Thus when the first carriage releases, the stock is already gripped and is being moved forward by the second carriage.

When an amount corresponding to the length of the finished bar has moved forward, the end of the bar trips a contact.

This adjustable length contact in turn engages the flying shears which are moving at the same speed as the bar. After shearing, the cut-to-length bar moves automatically into the straightening and polishing section of the machine. Here it is perfectly straightened and highly polished between high-speed-steel disks.

Bar Rotates Too—These polishing disks rotate at the same speed.

At the same time, the bar passing between them is given a rotating motion as it is thrust forward by the disks. The bar then moves on through straightening bushings running in roller bearings.

Position of the center straightening bushing is adjustable. Thus the fast-rotating bar is given more or less deflection, so that it comes out perfectly straight.

A second set of polishing disks further polishes the bar which is delivered into the delivery cradle ready for bundling and shipping.

Can Vary Speed—Speed at which the bar moves through the machine can be regulated for rates up to 136 fpm.

Conventional sulphurized oil lubricants are used.

Although they're used rather extensively on steel bars in Europe, the machines have been adopted here chiefly for non-ferrous work. One steel company has a modified machine originally intended for non-ferrous work.

Keystone's expansion plans call for adding a larger unit to handle 1/2 to 13/16 in. bar sizes.

Magnetic Tape Controls Positioning Table Motions

It goes without saying that it isn't only the mass-production industries that can benefit from automation.

Increasingly, controls are being made available to give short-run, general purpose machine tools ability to act on their own.

Latest development: a magnetic-tape-controlled positioning table.

■ Development of a fully-automatic positioning table gives smaller metalworkers another leg up on the road to automation.

The magnetic-tape-controlled table is built by Allison Equipment Co., Santa Monica, Calif., to fill the need for a portable, precision machine. It's simple enough so operators need no special training.

Both table motion and speed are continuously controlled. Thus milling can be done as well as stationary part operations.

Table motion is along two perpendicular axes in a horizontal plane. Travel at 45° angles to these axes is achieved by connecting the two axes together during recording. Range of motion is 20 x 10 in. Overall table dimensions are 50 x 35 x 15 in. high. The console measures 22 x 19½ x 48 in. in height.

Cuts Operator Time—The equipment cuts operator time sharply. He need only put a blank on the machine and start the sequence for each part (when recording is complete). Thus, one unskilled man can run several machines. Other advantages show up. Parts are more accurate and uniform, and fewer of them are rejects, since the human element is out of the picture. And the machine produces parts faster.

Making matching right and left-

hand parts from a single recording is simple. The operator can push switches to reverse all movements of either shaft. Other switches allow him to stop the automatic sequence in mid-stride, to inspect drill sharpness, depth setting, etc. Another switch restarts the tape automatically after rewind, for making a series of small parts.

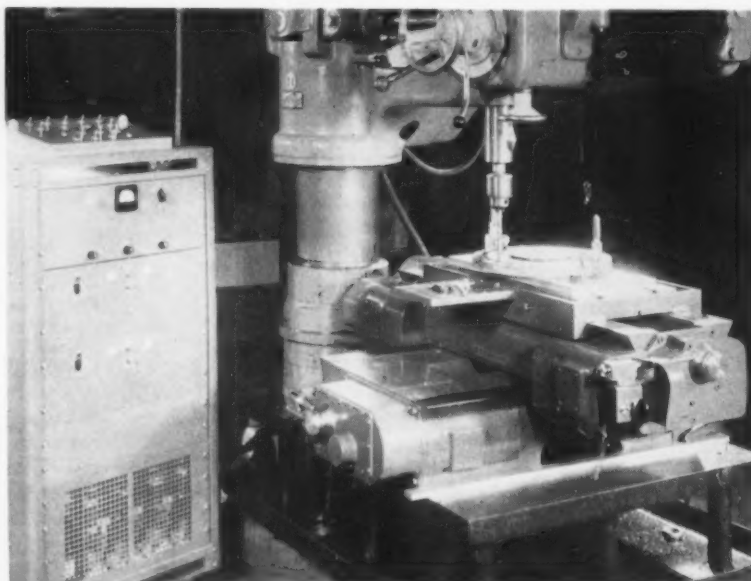
Takes 14-in. Reels—The tape handler accommodates reels to 14-in. diam—enough recorded information for 40 minutes of table running time. Tool operation time doesn't count, since the tape stops then.

Seven channels of information are recorded on the ½ in. magnetic tape. Four produce the table motion; one stops the tape during machining; one controls spindle movements of the machine to which the table is attached, and one rewinds the tape when a part is finished.

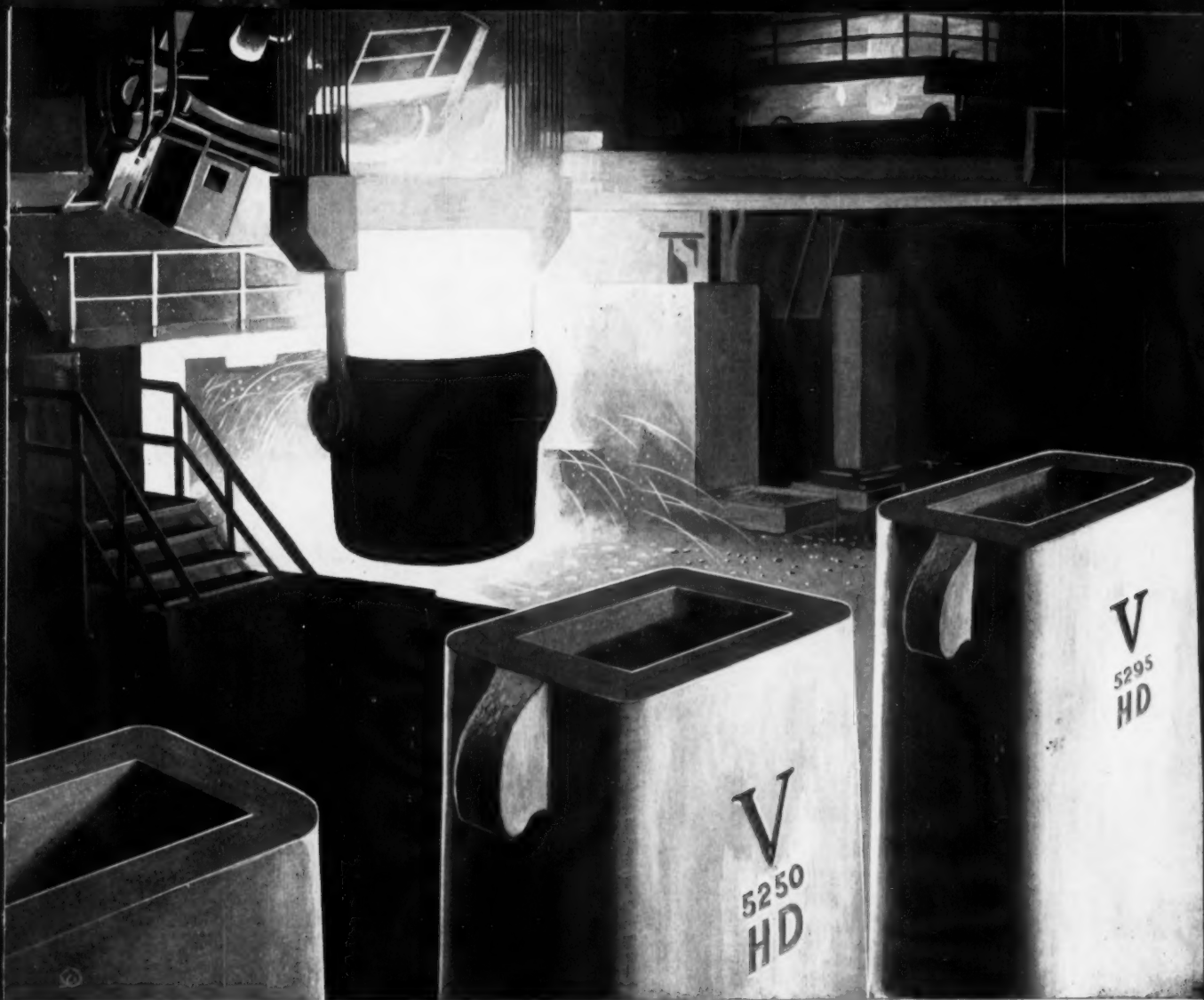
Mostly Manual—Most recording is done by operating the table manually. But tapes can be prepared—by using special recording equipment—for milling circles, arcs, and odd shapes. The small job shop generally finds it more convenient to splice purchased, pre-recorded tape sections into its own tape, than to go to the expense of investing in more complicated recording equipment.

If no further parts are to be made from recordings, the tape can be stored for future production or it can be re-recorded for other parts. It's possible to prepare duplicate tapes. This simply by tying two machines together through specially-provided receptacles.

Applied to Lathe—The control system is interesting in that it can be adapted to nearly any machine tool. It has been successfully applied, for instance, to an engine lathe.



READY TO SOLO: Fitted with tape-controlled positioning table, this machine is equipped to carry out recorded instructions on its own. Table runs 40 minutes on one 14-in. reel of recorded information.



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Catalogs and Bulletins

Tool room lathes

An 8-page, well-illustrated foldout shows tool room lathes and their components. These machine tools have a "dial-master" headstock with 32 pre-selective spindle speeds in geometric progression. They use an adjustable driving clutch and brake. This permits speedy adjustment of the brake to the work size. A totally enclosed gear box, powered from the headstock spindle through the end gearing, keeps out foreign matter. The 8-page literature describes a special apron, carriage and compound, bed, taper attachment, tailstock and spindle nose. *The Sidney Machine Tool Co.*

For free copy circle No. 1 on postcard, p. 97

Ultra-violet light

A specifications sheet delves into ultra-violet light. It explains how this helps industry in lighting, advertising, inspection, testing, research, etc. The sheet offers a helping hand to anyone with a problem that might be solved by ultra-violet processes. *Ultra-Violet Processes, Inc.*

For free copy circle No. 2 on postcard, p. 97

Substations

Seven publications comprise a unit substation silver anniversary technical library. *General Electric Co.*

For free copy circle No. 3 on postcard, p. 97

Roller chain

Bushed roller chain is the subject of a 16-page publication. For long life under severe conveyor and drive conditions, the balanced design of this chain provides extra strength, high wear resistance and wide application flexibility, it explains. All the fixtures, plus application and selection data are detailed. *Link-Belt Co.*

For free copy circle No. 4 on postcard, p. 97

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 97.

Electrical steels

Thin electrical steels are analyzed in a 56-page manual. It gives test results on three types and five different thicknesses of thin electrical steel. Some of these data have not before been available. For free copy, write on company letterhead to *Armco Steel Corp., Middletown, Ohio.*

Tractor

A comprehensive bulletin describes a tractor for use with monorail hand and electric hoists up to 3-ton capacity. *Yale & Towne Mfg. Co.*

For free copy circle No. 5 on postcard, p. 97

Sheet metal work

Power operated machines for light sheet metal work are summarized in a 20-page booklet. It provides quick reference to principal models. *Niagara Machine & Tool Works.*

For free copy circle No. 6 on postcard, p. 97

Burner

A compact, self-contained burner is presented in a data sheet. This unit has integral construction of the burner and combustion chamber. Its clean, short flame combustion is 80-pct complete within the burner. It uses residual fuel oil or most conventional fuels. It converts from one fuel to another without shutdown. *Thermal Research & Engineering Corp.*

For free copy circle No. 7 on postcard, p. 97

Gears

An industrial gearing and speed reducer manufacturer is making available a new gear catalog. It contains information on materials and heat treatment, cutting capacities, tooth forms, comparisons for milled-form and generated spur gears, revised rules for ordering, AGMA Class 1 hp ratings, AGMA hp formulas, AGMA lubrication specifications, shaft size formulas and tables, maximum bores for pinions, and moment of inertia. *For free copy write on company letterhead to Horsburgh & Scott Co., 5114 Hamilton Ave., Cleveland 14.*

Noncombustible cleaner

Solvent for use where fire safety regulations demand a noncombustible cleaner is reviewed in a 2-page sheet. It recommends the solvent for cleaning electric motors, switch gears, dismantled parts and other moderately soiled parts. *Magnus Chemical Co., Inc.*

For free copy circle No. 8 on postcard, p. 97

Mechanical packings

Popular mechanical packings used in industrial, power, and processing plants are listed in a 4-page folder. There are many types of mechanical packings produced from a few basic materials; at times duplications are unknowingly purchased. In an effort to eliminate confusion and large plant inventories of mechanical packings, this literature tells how one firm has standardized basic packing materials. *Flexrock Co.*

For free copy circle No. 9 on postcard, p. 97

Fork trucks

Three new 2-page 2-color bulletins detail battery fork trucks. They describe trucks with 5000, 7000 and 8000-lb load capacities. *Mercury Mfg. Co.*

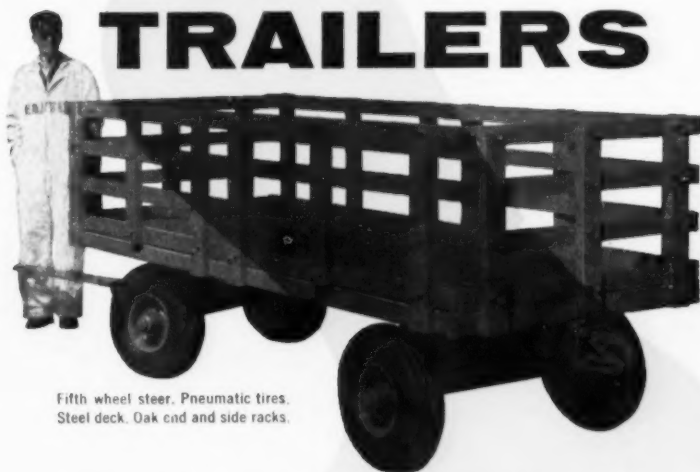
For free copy circle No. 10 on postcard, p. 97

Plating rectifier

A foldout chart presents data on a germanium plating rectifier. A complete description is listed. The literature also covers advantages of reactor control. *The Udyllite Corp.*

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YARD and FACTORY TRAILERS



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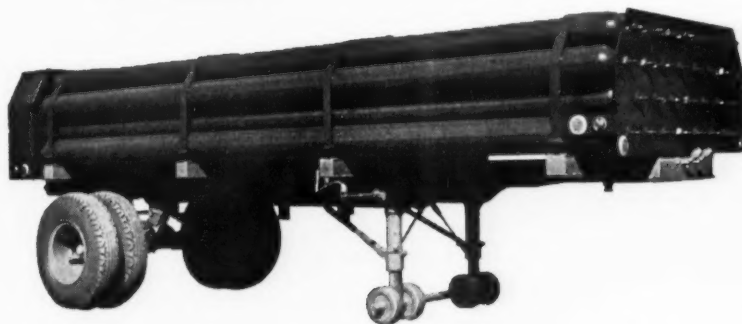
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FREE TECHNICAL LITERATURE

Brass nuts

Literature now available describes brass machine screw nuts machined from the bar and counter-sunk both sides. They are worked from high tensile strength brass rod on high speed automatic machinery. Threads absolutely square with both nut faces, make their use advantageous in automatic nut running and automatic assembly operations. *Cornell Mfg. Co.*

For free copy circle No. 12 on postcard, p. 97

Set screw

Size and price data cover a self-locking socket set-screw which is actually two screws in one. It withstands severe vibration and usage. Its construction provides a method of wedging screw threads without damage to threads. This prevents loosening the screw through vibration. The set screw is re-usable. *Sta-Loc Inc.*

For free copy circle No. 13 on postcard, p. 97

Alloy standards

The latest revision of the list of standard designations and chemical composition ranges for heat and corrosion resistant cast alloys is now available. Noteworthy is the addition of two new cast alloys of the 18-8 variety. *Alloy Casting Institute.*

For free copy circle No. 14 on postcard, No. 97

Heat treat furnaces

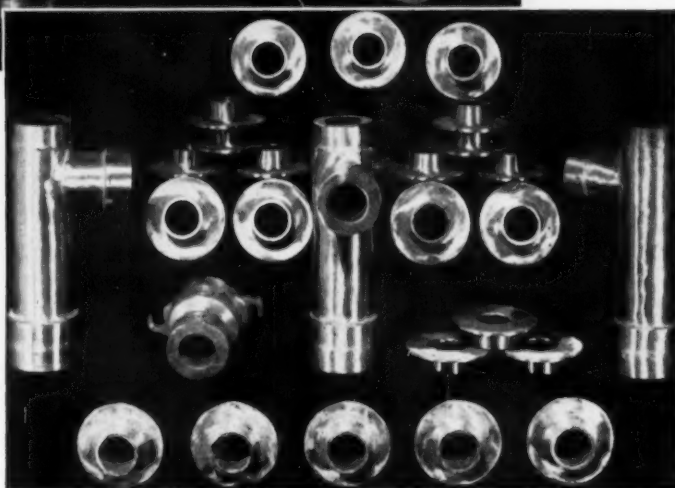
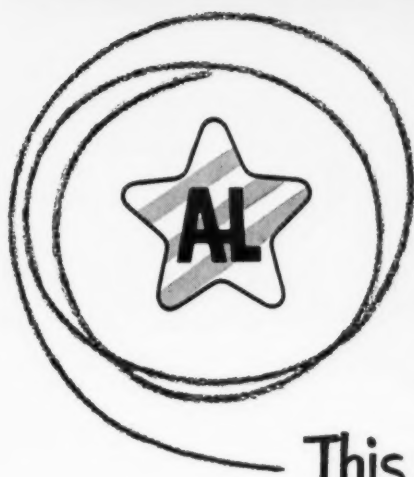
Containing 4 pages, a bulletin describes a firm's standard rated continuous treating heat furnaces. It contains specifications, process recommendation and application examples for snap hearth, cast alloy link belt and brazing furnaces. *Surface Combustion Corp.*

For free copy circle No. 15 on postcard, p. 97

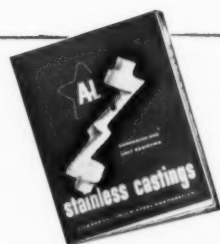
Marking machines

Several general purpose marking machines appear in a series of new bulletins. These units can mark round, flat or contoured products at virtually every production rate. Among units featured are small, bench-style mounted machines for intermittent, light duty marking applications to units capable of marking at 6-tons table pressure. *Jas. H. Matthews & Co.*

For free copy circle No. 16 on postcard, p. 97



This is the mark that means
clean, sound Stainless Castings all the time



Write for this book on
**AL STAINLESS STEEL
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28 pages of valuable and complete data on stainless castings: analyses, properties, technical data on handling and heat treatment, typical applications, how to order, etc.

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Every stainless casting produced by our Buffalo Foundry carries the familiar A-L Star trademark, cast into the steel. That means it's Allegheny Ludlum *time-tested* stainless steel—a pioneer that has successfully answered thousands of difficult corrosion and heat resisting problems.

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of casting stainless steel. You can depend upon Allegheny stainless castings to be strong, clean-surfaced, sound-structured and easy-machining . . . fully in accord with the service conditions and with your requirements for delivery.

Let our stainless foundry specialists quote on *your* casting needs—any size, up to thousands of pounds—regular production quantities or problem jobs. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*

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Tongue support part for New Holland baler, prepared with 75-ton Warco incline punch press, is shown fitted in place on Hayliner 68 assembly line at New Holland, Pa. Inspecting the job is Sub-assembly Foreman Lee Larkin.

Warco PRESSES

...Stand up!

"Not a breakdown in five years," says leading farm machine manufacturer

• Several years ago New Holland Machine Company, New Holland, Pa., purchased their first Warco Press . . . an incline punch press. It is still working as good as the day they bought it. Since then they have added other Warcos for piercing, blanking and forming a variety of machine parts. "We find these presses very satisfactory," say New Holland officials; "in our five years of using Warcos we have never had a breakdown."

Warco Presses stand up because they are built from the frame out to deliver maximum performance in the most difficult assignments.

THE FINISHED PRODUCT... Warco incline punch press had a hand in turning out this smart-looking, smooth-performing Hayliner 86 baler. The machine was designed to bring the average-size farm big baling capacity at smaller baler cost.



Using a 75-ton Warco incline punch press, operator Christian Good turns out tongue support parts. Watching the operation is Assistant Foreman Lester Howe. Ten-gauge hot-rolled sheet steel is used for the part.

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Among these Roebling materials are zig-zag and no-sag wires; mechanical and valve spring wires; music wire; clock and motor type spring wires; flat spring steel and upholstery spring wire of all types. The variety of parts into which these are formed is almost endless, but manufacturers all report that Roebling quality and uniformity reduce machine downtime.

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Youngstown blends the required combination of surface finish, tensile strength and ductility into every sheet, to provide you almost continuous pressings of even the most difficult-to-form parts. Also, metallurgical quality never wavers from Youngstown's high standards because all operations from ore mining to shipping dock are rigidly quality-controlled by experts with over half-a-century of steelmaking know-how.

On your next order specify Youngstown Cold Rolled Sheets and Strip and join the ranks of our satisfied customers who tell us: "Our production's up—Rejects down—Fabrication costs lowered."

Why not call your nearest Youngstown District Sales Office today, for metallurgical aid or additional information—or write directly to our Home Office.



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FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 92.

Machine tools

Functions and services performed by machine tool distributors are listed in a dozen-page booklet. It dramatizes machine tools as "one of our country's most essential investments in industrial and economic progress." *American Machine Tool Distributors Assn.*

For free copy circle No. 17 on postcard

Two-ton press

Designed for operations requiring a wide gap between column members, is a new 2-ton fixed bed, gap frame press. It supplies an opening 4½-in wide through the back. New literature describes it. *Benchmark Mfg. Co.*

For free copy circle No. 18 on postcard

Filing equipment

Illustrated literature announces new file equipment. It lists operating advantages and economies of a new elevator file for housing various types of records. It offers great efficiency in handling these, it states. *Diebold, Inc.*

For free copy circle No. 19 on postcard

Materials handler

Roller chain and link chain puller-lifts are covered in a catalog. A lightweight ratchet hoist, they come in ¾ to 15-ton capacities. *Yale & Towne Mfg. Co.*

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Tungsten coil

Tungsten coil products are described in a 12-page booklet. It contains text, photographs, charts and graphs, on coils and heaters. *Sylvania Electric Products Inc.*

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Graphites

Applications of graphites in iron and steel foundries and steel mills are covered in a 24-page booklet. Described is a high-grade fine clay blended with graphite and a special bonding agent. It comes in plastic form, standard 9-inch dry-pressed brick, or dry for use as mortar, ladle wash coatings and for casting shapes on the job. *Mexico Refractories Co.*

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Hydraulic valves

High pressure hydraulic valves are reviewed in an 8-page brochure. It lists 24 different styles. These range from 1500 to 20,000-psi working pressure. The catalog covers check valves, stop valves, operating valves and special models. *R. D. Wood Co.*

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Arc welding

Containing 24-pages an electrode data book gives information on AWS-ASTM arc welding electrode specifications. It tells how to estimate electrode consumption; presents a summary of welding symbols, and factors in selecting electrodes. *National Cylinder Gas Co.*

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Industrial periscopes

Industrial periscopes for remote observation of inaccessible places and the study of hazardous processes are illustrated in a 4-page catalog. They go through walls and contaminated or explosive atmospheres, around corners and under or over obstructions. *Lenox*

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Heat treat

Modern quenching techniques are discussed in an 8-page publication. Quenching media and temperature ranges essential to selection of suitable processes are illustrated by a series of tables, curves and charts. *Surface Combustion Corp.*

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Used machine tools

How to buy a used machine tool is explained in a primer. Written in question and answer form, it covers most aspects of used machinery purchase. *S & S Machinery Co.*

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Cast vinyl film

Clarity and toughness of vinyl film made by the casting method is demonstrated, and its uses and properties described in a 20-page booklet. Bound into it is a nearly invisible leaf of this material. *Bakelite Co., div. of Union Carbide and Carbon Corp.*

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Flat-type motors

Flat-type motors for machine tools and original equipment manufacturing are covered in a 4-page brochure. It describes both totally-enclosed non-ventilated flat-type motors and totally-enclosed fan-cooled models. *Diehl Mfg. Co.*

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Cemented carbides

"What You Should Know About the Carbide Customer Education Program" is the title of a new 16-page booklet. It points out courses provided by the program. These can benefit anyone who buys, uses or services cemented carbide products. *Metallurgical Products Div., General Electric Co.*

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Overhead handling

A pocket-size, 14-page circular presents a line of hand and electric hoists and related overhead materials handling equipment. Included are illustrations, descriptions and basic specifications of various models of electric hoists and cranes. *Chisholm-Moore Hoist Div.*

For free copy circle No. 31 on postcard

Profile recorder

An instrument for showing profiles of machined or finished surfaces is introduced in a 4-page brochure. It shows close-up photographs of three principal parts of the instrument: the pilot, tracer and amplifier. The bulletin also pictures reproductions of chart records. *Micrometrical Mfg. Co.*

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Dynamometer

A new publication describes an improved remote indicating dynamometer. Basically, the unit comprises a standard traction dynamometer, a pair of matched synchros and a remote case with a dial. One synchro attaches to the dynamometer mechanism and the other to the back of the dial in the remote cabinet. The entire apparatus is powered by two dry cell batteries plugged in externally. *W. C. Dillon & Co., Inc.*

For free copy circle No. 33 on postcard

Pipe crimper

A compound leverage pipe crimper for sheet metal work appears in a bulletin. This rugged, lightweight tool multiplies hand pressure to provide crimping power for reducing the diameter of sheet metal pipe. *Niagara Machine & Tool Works.*

For free copy circle No. 34 on postcard

Electric fork truck

A 4-page folder illustrates a 3000-lb capacity, electric-powered fork truck. It is designed for use where low headroom is a problem. *Elwell-Parker Electric Co.*

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Tungsten carbide

Characteristics of Kennametal Grade K501, a tungsten carbide with platinum binder for severe corrosion conditions, appear in a bulletin. *Kennametal Inc.*

For free copy circle No. 36 on postcard

Chucks

A 24-page catalog features five chucks. It covers: a precision and 6-jaw scroll chuck, a power chuck, a "no friction" compensating power chuck, a "power-type" keyway independent chuck, and a dust proof chuck. *Buck Tool Co.*

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Double-Row Angular Contact Ball Bearings 47.000 x 56.500 x 6.500"

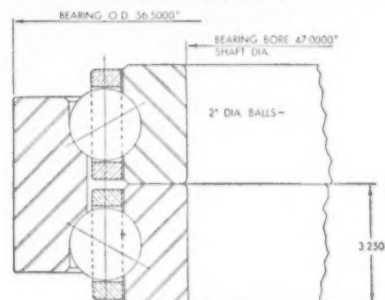
Here are the bearings that "couldn't be built" . . . as produced by Kaydon

THE manufacturer who wanted these bearings had been told they "couldn't be built." Or at least that's what he'd been told *until* he contacted KAYDON. What he required was a bearing 56½" in diameter combining high capacity, and exceptional precision for concentricity and face runout that would fit in limited space.

KAYDON designed a double-row angular contact ball bearing (see sketch at right). Actual tests have proved that the bearing fulfills every requirement.

If your designs require bearings of exceptional capacity, close-tolerance precision and/or very thin section — it will pay you to contact KAYDON of Muskegon. KAYDON has a long-standing reputation for accomplishing the near impossible.

CROSS SECTION — The bearing that couldn't be built



Just Out! Get your copy of the new KAYDON Reali-Slim thin bearing catalog No. 54.

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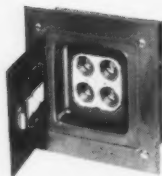
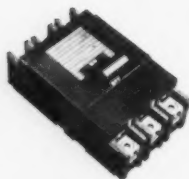
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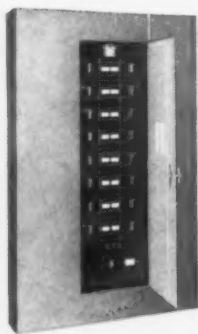
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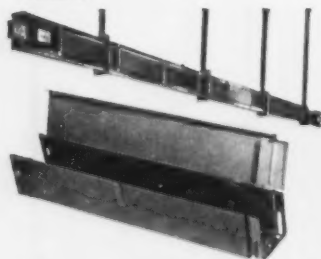
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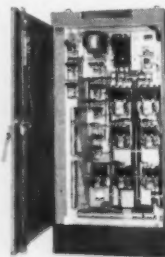
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Synchronous Starters



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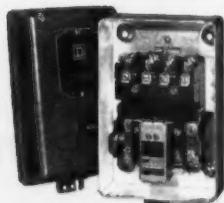
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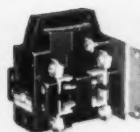
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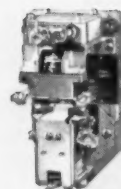
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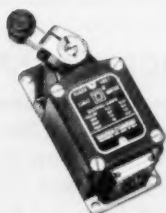
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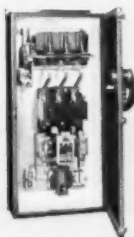
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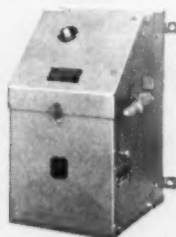
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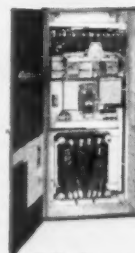
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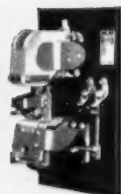
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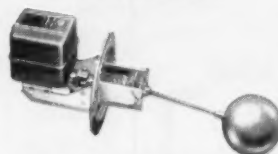
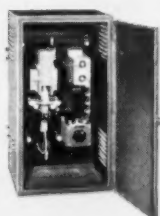


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• D.C. Starters

• Electronic and Electro-Magnetic Welder Control



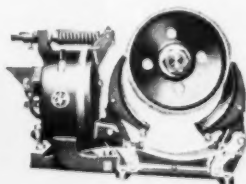
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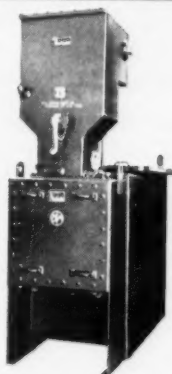
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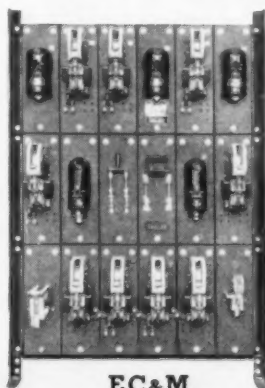
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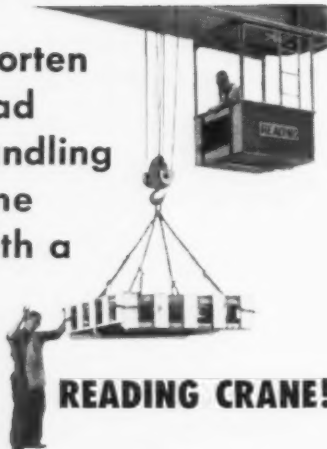
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TECHNICAL BRIEFS

CONTROLS: Jig Boring

Numerical controls now take over jig boring with obvious results . . . It goes beyond these, though, while positioning units to within 0.0001-in. accuracy.

Numerical control now operates jig borers, vertical hole grinders and rotary tables. It accurately positions units within 0.0001-in. The control comes close to complete automation of these machine tools.

Feeds "Blueprints"

Developed by Pratt & Whitney Co., Inc., West Hartford, Conn., the setup allows toolroom equipment to enter the field of volume production. All information for locating, indexing, boring and grinding is kept on punched tape.



Operator places "player-piano roll" of digital data into unit.

The control, when fed this data, gobbles it up and translates it into mechanical action on the machine. Like other systems of this type, its purpose is to feed "blueprints" directly to the machine tool.

Most advantages of this set are obvious. It eliminates the human error in reading or setting dials or verniers. Unlike a two-armed man, it rapidly sets all slides and verniers simultaneously.

Possible money savings could result from a reduction of scrap loss.

Other possible advantages are: increased operating speeds, better efficiency, lower setup time, con-

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 97. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

stant precision, fewer jigs and fixtures, and faster cycle times.

Since numerical control offers automatic programming, the high precision of jig borers, hole grinders and rotary tables joins the production line. Punched tapes are usually easily prepared. They are comparatively inexpensive, and replace complex fixturing.

This doesn't mean, however, that the controls cannot be used for



Numerical control automatically runs this precision hole grinder.

short-run jobs. Pratt & Whitney recommends them for light production and for machining one or two pieces with multiple holes. This results in less operator fatigue, they say.

Materials:

Specialty tool steel broadens hardening range.

An oil-hardening, non-deforming tool steel, known as Stentor, can now be hardened safely over a broader temperature range than before. The new range is 1425 to 1525°F. Carpenter Steel Corp., Reading, Pa., its producer, did this without changing its simplified analysis.

Alloys Cause Problems

Some alloys have, in the past, caused some scheduling problems in heat treat departments. Stentor, for example, can be hardened from temperatures as low as 1425°F; tools and dies made from some other grades require hardening temperatures in the range from 1475 to 1525°F. These, of course, could not be hardened satisfactorily in the same batch with the other material. So the company developed this new range. It makes possible fitting the material into many heat treating schedules during the average day.

Grinding Tools Unnecessary

For minimum size change of less than 0.0004 in. per in., hardening from 1425°F is still recommended. However, the broadened hardening range expands the safe hardening limits. The new alloy increases in size about 0.001 in. per in. when hardened but when drawn between 300 and 400°F it will return to within 0.0004 in. per in. of its original size. Because of this minimum size change and the freedom from decarburization in heat treatment, these tools are used without grinding after hardening.

Welding:

Stainless steel weldments show few failures.

Stainless steel weldments under service conditions reveal relatively few failures. So states G. E. Linert, a research welding metallurgist at Armco Steel Corp.

He says performance data shows that many service failures result



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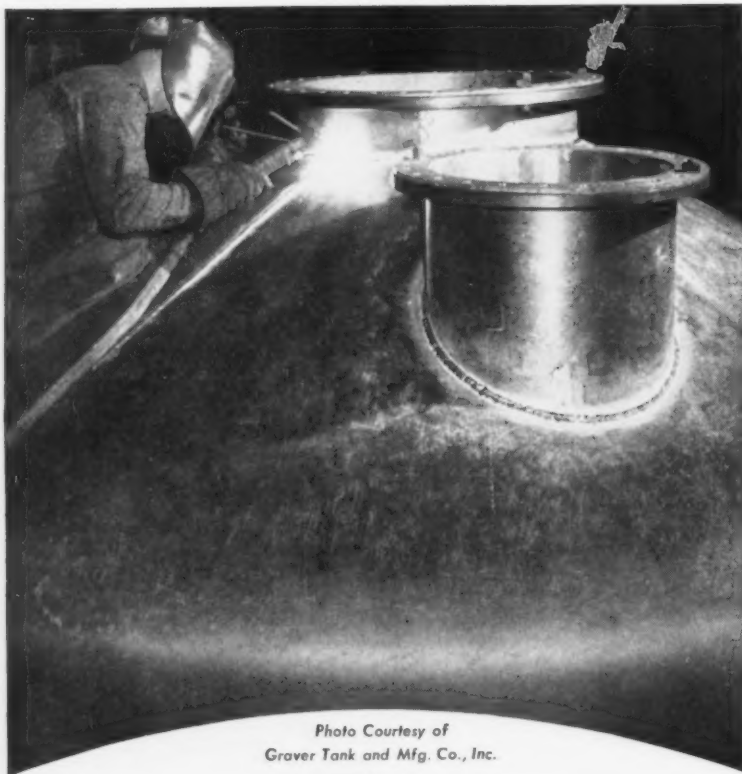


Photo Courtesy of
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The inert-gas-shielded-arc process made aluminum welding practical . . . but it takes Arcos quality in aluminum bare wire to assure you the most dependable results possible. Because no flux is used, the chemical analysis and cleanliness of the wire must be within exacting limits. Arcos' long experience with weld metallurgy, plus rigid controls in manufacturing, guarantee this vital factor. Arcos aluminum wire is your best assurance of stronger, more ductile, more corrosion-resistant welds.

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TECHNICAL BRIEFS

from conditions having little or nothing to do with welding.

Approximately 750,000-tons of stainless steel are fabricated annually. A substantial portion of this is subject to welding. Weldment failures constitute a very small percentage of the total weldments, says the metallurgist.

The researcher classifies the causes of failure as follows:

First, a notch effect occurs sometimes at unfused abutting joints, the edge of convex welding beads or other marked changes in section causing concentration. This leads to fracture through overloading under static or shock loading; it might occur also by fatigue cracking under cyclic loading.

Tension Causes Cracking

Second, stress-corrosion cracking sometimes takes place when the weldment is subject to tension stress and certain corrosives at the same time. These corrosives are usually hot solutions bearing chlorides.

Third, contamination may develop on the surface. This happens during fabrication, inspection, shipment or in service.

These observations were made in a technical paper on trouble-free service from stainless steel weldments. This was presented recently at a conference of the American Welding Society, held in Chicago. Armour Research Foundation and Illinois Institute of Technology co-sponsored the gathering.

Forging:

Forged wind tunnel disk measures 210½-in. across.

Measuring 210½-in. diam in its rough form, a large wind tunnel disk weighs 170,000-lb. Prior to machining, the disk was 44½-in. at its hub.

Produced at Midvale-Heppenstall Co., Nicetown, Pa., the forging will become part of a pressure wind tunnel at the NACA Langley Aeronautical Laboratory. It will first be machined; then it will become a giant fan hub. Mounted to the hub will be 47 blades. These are made

of laminated glass fiber cloth and plastic. The completed fan will be 35-ft in diameter.

This fan is part of the 19-ft pressure wind tunnel to be used for dynamic experiments with aircraft models at transonic speeds. The air passage in this tunnel will form a closed loop of varying diam-



Ready for shipment, this forging weighs in at 17,000-lb.

eter. The smallest section of this will be the test section where aircraft models will be mounted.

Winds at speeds ranging from low sub-sonic into the transonic (800-mph up) will be created by a 20,000-hp motor. The motor will be connected to the fan hub thru a shaft and the entire assembly will be enclosed in a 27-ft diam nacelle 165-ft long.

Forming:

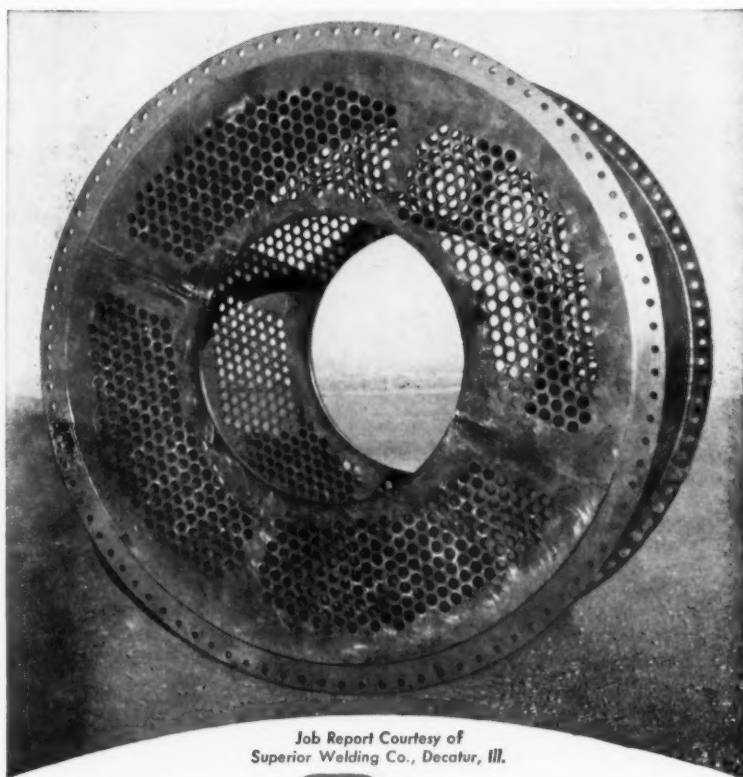
Bench boosts output of cold drawn tube.

Substantial increases in production of drawn welded steel tubing at Republic's Steel's tube division are resulting from installation of a 100,000-lb multiple bench. This cold draws tubing in sizes from $\frac{3}{4}$ to 5-in. OD.

Since installation of the new draw bench, production capacity is up 35-pct for large size and heavy gage tubing. For these, the machine operates as a single draw bench. With medium size work, it draws two or three tubes simultaneously.

Equipped for either "sink" or

How to get trouble-free service from welded stainless equipment



Job Report Courtesy of
Superior Welding Co., Decatur, Ill.

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This heater or calandria section of a finish evaporator used in the food and chemical industries is made of Type 316 stainless plate. Equipment such as this must resist the corrosive attack of the acids in the liquids being processed. ARCOS Chromend KMo (Type 316) Electrodes were selected because of their known ability to produce sound weld metal that defies the destructive action of sulphuric, acetic, and similar organic acids. For trouble-free weld metal—easily deposited—use ARCOS Electrodes.

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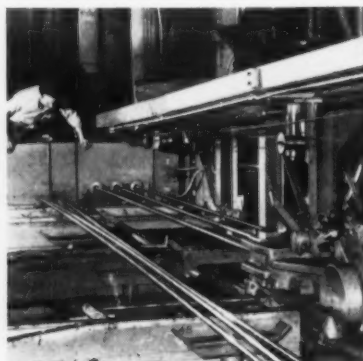
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TECHNICAL BRIEFS

"mandrel" drawing, the new bench is a modern design, single chain type with a block carriage. It is so set up that it can use alternate carriage blocks with single, double or triple grips, as the work requires. This may involve drawing to obtain a specific outside or inside diameter size, wall thicknesses or possibly a change of physical prop-



This 100,000-lb multiple draw bench cold draws 5-in. OD tube.

erties, as well as furnishing special smooth inside diameter surfaces.

The bench produces to extremely close tolerances. It turns out other than standard shapes, particularly in large sizes and heavy wall thicknesses.

A variable voltage type 200 hp drive permits adjusting of drawing speeds over a wide range. Mechanical loaders push the tubes over the rods when "mandrel" drawing; hydraulically operated unloading arms move the tubes to crane bucks.

Tube Remains Stationary

A 5-in. Stevens and Bullivant pointing swager provides added pointing capacity for both medium and larger sizes. In this type machine the work and swager dies do not rotate. With this combination, the swager produces a sharp taper on the end of the tube. It thereby reduces the length of the point.

Since the tube remains stationary, surface scratches are reduced in the pointing operation. The pointer is driven by a 40 hp ac motor.

New Books:

"ASTM Standards On Petroleum Products and Lubricants" includes data on lubricants used in metalworking. It is not devoted exclusively to this, however. Much of it covers petroleum outside metalworking. \$7.50 per copy, clothbound (\$6.75, paper cover.) American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

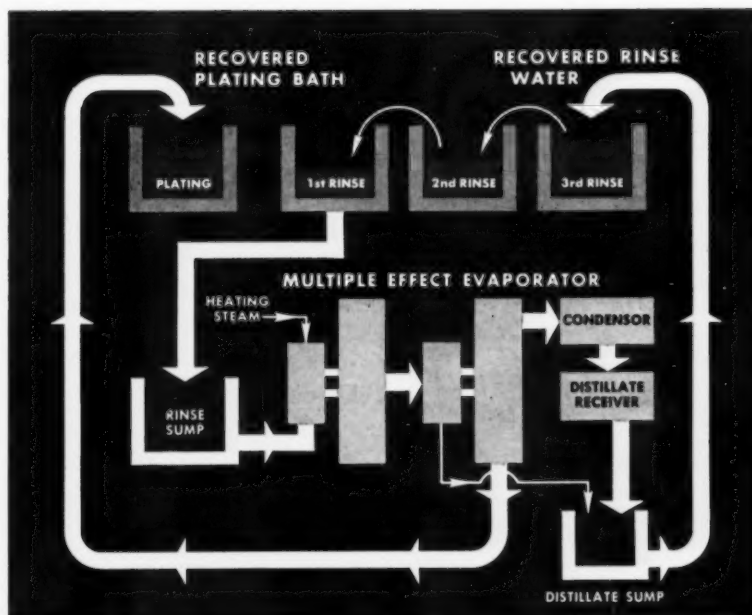
"Encyclopedia of Chemical Technology" claims the title of the largest technical book ever published. It took 13 years to compile. Worth noting is that it is an American publication. 13,805 pp. 620 pp. index. \$375 per 15-volume copy. Interscience Publishers, Inc., 250 Fifth Ave., New York 1.

"Surface Treatments of Low Alloy Steels" is an Air Force guide for contractors; it covers surface treatments for low alloy steel for corrosion and oxidation resistance. In addition to coating techniques, the manual describes: analyses of temperature ranges to which each technique applies, cost and life limitations, possibilities of assembly treatments, and formability and weldability methods for materials treated before assembly. 261 pp. \$5.00 per copy. U. S. Department of Commerce, Washington 25, D. C.

"Conveyor Terms & Definitions" is a combined dictionary and standards catechism approved by the American Standards Assn. It defines about 1500 terms on materials handling equipment; nearly 100 drawings illustrate the book. 64 pp. \$1.00 per copy. Conveyor Equipment Manufacturers Assn., One Thomas Circle, Washington 5, D. C.

"Unfired Pressure Vessel Code Simplified" by Robert Chuse, is an analysis of the 1956 ASME code. It attempts to make the code easy to use with a corresponding saving in time and material. 30 pp. \$6.50 per copy. Robert Chuse, PO Box 91, Leonia, N. J.

"Platinum Metal Review" is a quarterly for the trade. It is published in Great Britain. Copies available from Johnson, Matthey & Co., Inc., 608 5th Ave., New York City.



New recovery system cuts plating costs!

Industrial's Plating Bath Recovery Equipment provides complete recovery of acid and metal dragout losses, using a rapid evaporation process engineered to suit your operation. The savings can be fantastic... the system not only returns fresh plating solution to the bath and pure water to rinse tanks... it eliminates the high cost and trouble of neutralizing corrosive rinse water for disposal.

Here is a typical example of what Industrial engineers can do:

Saves \$925.00 per week. A company plates metal parts with a copper-tin-lead alloy, using a series of plating machines with a total bath drag-out of 16.65 gallons per hour. Replacement of solutions and destruction of rinse water (to avoid damage to sewage systems and to meet anti-pollution requirements) costs \$12.46 per hour. **Recovery with an Industrial unit costs \$2.13 per hour.** The equipment pays for itself in 164 working days.

Unbelievable? ... No sir! ... these are systems designed by a company with a 30-year reputation for building the best in plating equipment. Let us prove it—our staff will be glad to make an analysis of your process, recommend equipment and estimate costs and savings.

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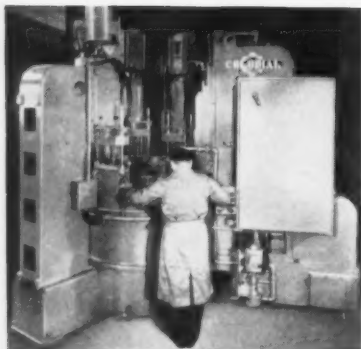
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NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 97 or 98.

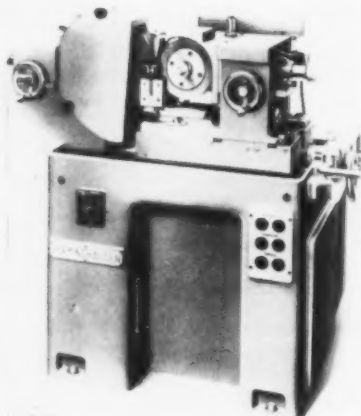


Machine combines broaching, drilling, reaming, chamfering

In this machine, surface broaching is integrated with drilling, reaming and chamfering. The machine tool performs 14 operations on each of two parts at one time. It has an output of 304 pieces per hour at 80-pct efficiency. Cycle time, including loading, is 18 seconds. Though it can adapt to many parts, the unit presently makes automotive pawls. Sequence of operation on this part is: load two parts;

drill four holes halfway; drill through; chamfer both sides of the holes; ream; broach four surfaces on both parts in one pass; and unload. In operation, blanks are hand fed, hand clamped and spring located in double fixtures on the indexing table. Loading and unloading time is 8 seconds. Indexing is hydraulically actuated. *Colonial Broach & Machine Co.*

For more data circle No. 38 on postcard, p. 97



Precision centerless grinder offers high capacity

With a 1-in. capacity, this precision centerless grinder is equally well suited for infeed, throughfeed or barfeed. Its distinctive features are its design simplicity, versatility and high capacity. The machine handles medium work such as cylindrical and taper pins, for instrument and precision parts. It is accurate and provides an excellent surface finish. The grinding wheel and regulating wheel spindles operate in preloaded adjustable precision roller bearings. Grinding

wheel spindle bearings are lubricated by oil mist while the feed regulating wheel spindle runs in oil. Feeding the feed regulating wheel slide towards the grinding wheel makes diameter adjustments. This slide mounts on rollers to reduce friction. The unit feed nut is split and spring loaded to eliminate backlash. Adjustments can be taken in steps of 0.0001-in. readable on a micrometer screw. *Hahn, Hallett & Willcutt Machinery Co.*

For more data circle No. 39 on postcard, p. 97



Kit readily converts 65-ton press into 300-ton model

Presses with a 65-ton capacity readily convert to 300-ton models using an easily installed kit. This insures against future product design changes or increased output making present equipment obsolete. The kits cover 65, 125, 170 and 300-ton conversions. In addition, the models supplied in these tonnages have completely self-contained hydraulic systems and controls. They also come as basic units for connection into a central system. The entire welded steel press construction has internal

ribs; this provides rigidity and torsional load resistance. All welds in the entire structure are in shear loading for strength and durability. Normalizing the entire weldment eliminates structural stresses. After this, the hardened steel ways are machined and ground in place for precision accuracy. The deep box-type upper platen provides an extra long bearing surface; this maintains operational precision and gives long life. *King Machine & Mfg. Co.*

For more data circle No. 40 on postcard, p. 97

Hand Turret lathe features 1-in. capacity, 16 speeds

This hand turret lathe has a 1-in. capacity. Featuring a two-speed reversible motor, the machine has 16 spindle speeds and is driven by a V-belt between the antifriction bearings in the headstock. A single lever starts and stops the spindle, opens and closes the collet and applies a spindle brake. By choosing another electric circuit on the control board it is possible to have the machine running continuously while opening and closing the collet.

A choice of two spindle speeds in the ratio of 1 to 4 in forward and reverse is available at the finger tips on the control board. A sturdily designed forming and cut-off slide and a six-station indexing turret with $\frac{3}{4}$ -in. tool holder bores complete the machine. A coolant pump and fox type threading attachment are available, as well as a bar feed. *Eric R. Bachmann Co., Inc.*

For more data circle No. 41 on postcard, p. 97

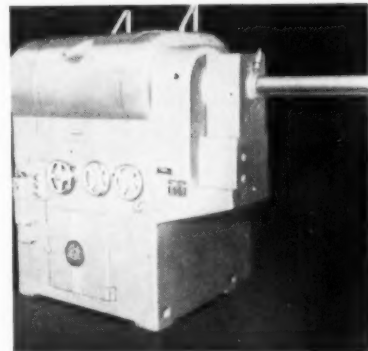


Gear speeder noise checks special large-size gears

Easy and true noise inspection of large size mating gears is possible with a modified standard gear speeder. The unit uses enclosed spindles and a special built-in listening horn for good definition of noise characteristics. The machine can be provided with fittings for contact microphones and other acoustical equipment. In operation, only one spindle is driven with brake loads applied to the opposite

spindle. The driven spindle is reversible. Control of the gear speeder is simple, using push buttons and manually operated handles. Four spindle speeds (580, 870, 1160 and 1740 rpm) result from a four-speed constant-torque $\frac{3}{4}$ -hp motor. The speeder will accept gears to 23-in. maximum diameter with 10-in. minimum face. *Michigan Tool Co.*

For more data circle No. 42 on postcard, p. 97



Heavy-duty power saw uses high speed steel saw blades

This heavy-duty power saw uses high speed steel saw bands. Work capacity is 12 x 12-in. in size and 1500-lb in weight. Setup and operation are simple enough to make it useful in a shop where a full time operator is impractical. Accuracy of cut is 0.002-in. of diameter. Typical cutting rates are: under two minutes for a 5-in. round of mild steel, five minutes for a 3 $\frac{1}{2}$ -in. square of 18-8 stainless, 19 minutes for an 11 $\frac{3}{4}$ -in. round

of oil hardening tool steel. It is ruggedly constructed, chiefly of steel weldments. Hydraulic band tension not only makes band tension automatic, but also simplifies machine set-up by relieving the operator of estimating proper tension. The saw uses a saw band 1-in. wide and 129 $\frac{1}{2}$ to 132-in. long. A 1 $\frac{1}{2}$ -hp motor gives blade speeds of 90, 125, 180 and 250-sfpm. *The DoAll Co.*

For more data circle No. 43 on postcard, p. 97

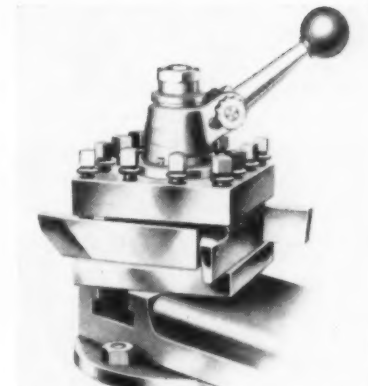


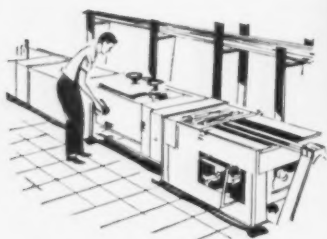
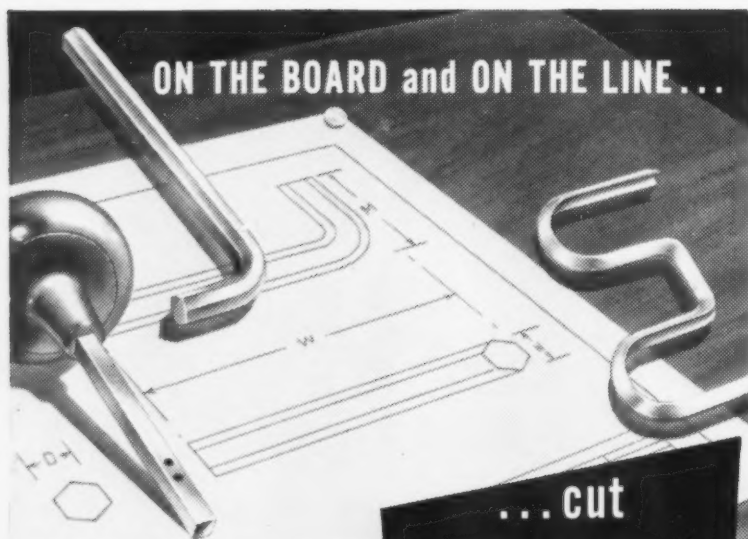
Clamping type handle locks turret tool post on lathe

A clamping type handle on this turret tool post assures positive locking. It also enables the turret to withstand vibration even when handling interrupted cuts. It can accommodate fast feeds and speeds of modern, heavy duty production lathes. The action is fast and simple. Just raising the handle from an approximately horizontal position to about a 45° angle clamps a locking collar tightly around the turret's center column with a pow-

erful cam action; this locks the turret rigidly. Hand pressure only is required. There is no need to pound the handle or use an extension pipe. The turret unlocks easily, simply by lowering and pushing the handle slightly. This permits the turret to rotate freely to any of 12 indexing positions to bring the required tool for the next operation into proper position to make the next cut. *McCrosky Tool Corp.*

For more data circle No. 44 on postcard, p. 97

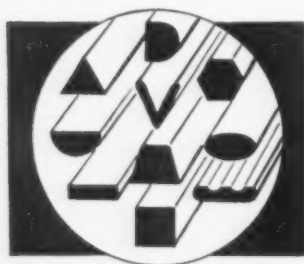




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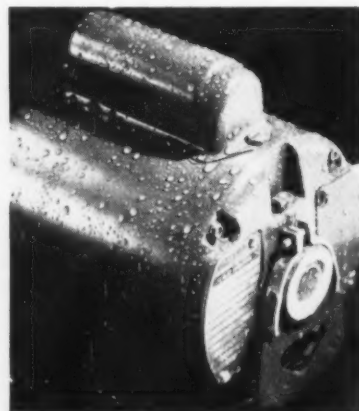
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FOR OVER
HALF A CENTURY

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NEW EQUIPMENT

Door motors

Instantly reversible door-operator motors have special insulation to resist moist-air conditions. These, and reversing-from-standstill models are included in a complete line. At 1735 rpm, ratings from 1/6 through 3/4 hp provide power for door types ranging from light-

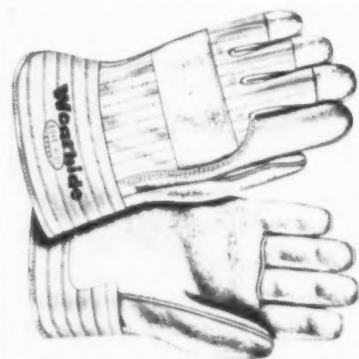


duty ones to heavy-duty industrial doors. Designed to operate in any position, the motors have all-angle sleeve bearings and a lubrication system; this prevents oil loss even when mounted vertically. For further versatility, the motor can be rotated in its base. *General Purpose Motor Dept., General Electric Co.*

For more data circle No. 45 on postcard, p. 97

Industrial gloves

Industrial gloves feature long wear, high abrasion resistance, and extreme flexibility. In actual tests,

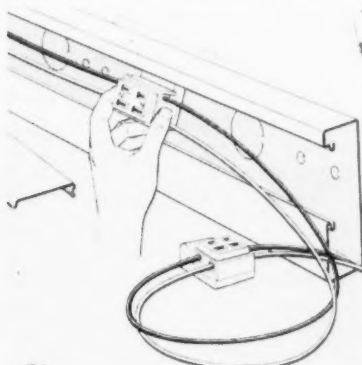


these gloves had a total weight loss of only 7-pet in 5000 strokes of testing apparatus. *Wearhite Glove Co.*

For more data circle No. 46 on postcard, p. 97

Electric wiring system

A new electric wiring system fits into the baseboard on practically any wall. It requires no footers, trim, or capping of any kind. Three fittings mount the duct: an end blank, a combination internal and external elbow for corner areas, and a standard coupling. It comes in 5-ft lengths, with duplex receptacles on 30 or 60-in. centers. Over-



all dimensions are: 3-in. high x 3/4-in. wide. Receptacles used within the system are preassembled to the wiring harness at the factory. They are held in place within the duct without recourse to any additional support. Mounting holes in the base provide for easy installation. *National Electric Products Corp.*

For more data circle No. 47 on postcard, p. 97

Nickel alloy pig

A palletized, all-fiberboard carton, measuring 39 x 29 x 8-in., contains a nickel alloy pig. The freight-saving carton weighs only one-fourth as much as a conventional

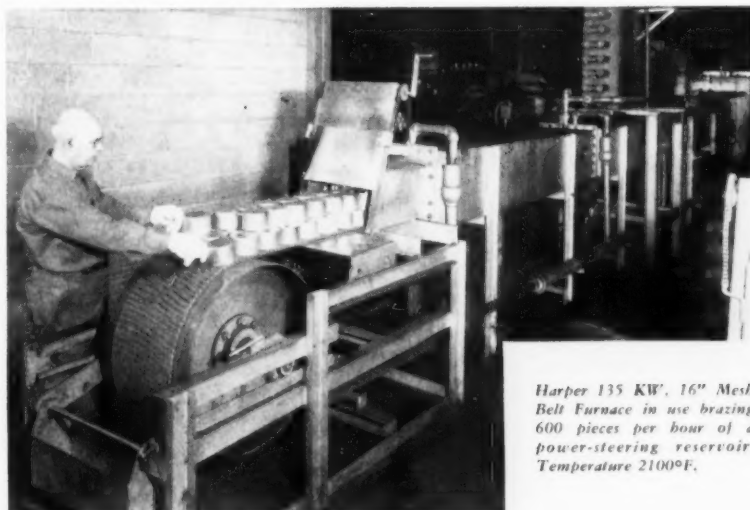


wooden pallet. It can be fed into electric furnaces as a unit, reducing handling costs. Each carton carries a certified metallurgical analysis on its side panel. *Alloy Metal Products, Inc.*

For more data circle No. 48 on postcard, p. 97

Want Higher Furnace Production?

MODERNIZE WITH HARPER HIGH TEMPERATURE MESH BELT FURNACES



Harper 135 KW, 16" Mesh Belt Furnace in use brazing 600 pieces per hour of a power-steering reservoir. Temperature 2100°F.

If you need up to 50% greater continuous furnace capacity without increasing space; and if your operating temperature range is 1800°-2100°F, a modern Harper Mesh Belt Furnace may well be the answer to your requirements.

These compact continuous furnaces are designed to utilize fully the advantages of silicon carbide heating elements* and today's high temperature oxidation-resisting alloy mesh belts.

Silicon carbide resistance heating elements allow high concentration of heat in a small space, thereby providing considerably greater production than furnaces of similar size using ordinary nickel alloy elements. Silicon carbide elements are also replaceable without complete furnace shutdown.

Two more important advantages of Harper Mesh Belt Furnaces are:

1. MULTIPLE-ZONE HEAT CONTROL — Heating elements are connected in

several individually - powered and controlled zones for maximum flexibility of the heating curve.

2. PRODUCT UNIFORMITY — Furnace design based on many years of experience plus properly applied control instrumentation means uniform product day after day.

There are many more plus values. These economical furnaces are designed for operation with all types of standard atmospheres. An automatic non-loading belt take-up mechanism adjusts belt tension without reducing useful belt loading. A small water-cooling chamber next to the hot zone can be readily removed for maintenance or replacement due to rapid oxidation.

Harper Mesh Belt Furnaces are available with or without alloy muffles. Matching preheat furnaces are also obtainable. For full information write for Bulletin 454 to Harper Electric Furnace Corporation, 49 River Street, Buffalo 2, New York.

*Nickel alloy elements available for lower temperature applications.

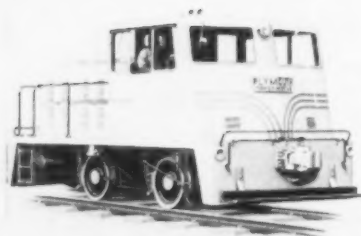
. . . Visit Booth No. 224 at the Western Metal Exposition . . .



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Medium duty switchers feature a "cab-in-front" design

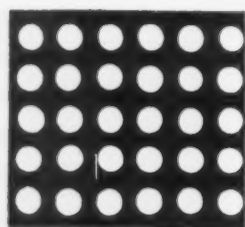
Following the trend of the larger railroad diesels, a new line of medium duty switching locomotives uses the "cab-in-front" design. This is offered in the 25 to 40 ton weight range with either four or six wheel drive. The "cab-in-front" is a complete reversal of the industrial switcher as it has been constructed in the past. The new streamlined cab offers the operator almost un-

obstructed vision in all directions and right down to the front coupler. Air tanks and other equipment formerly mounted outside are now enclosed within the cab; yet they are fully accessible. The engines all use hydraulic torque converters coupled to the diesel locomotive's transmission. *Plymouth Locomotive Works.*

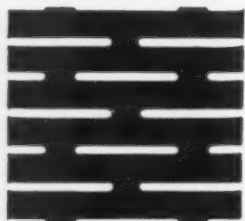
For more data circle No. 49 on postcard, p. 97



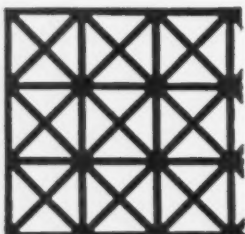
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2689

Welding machine

A new high production five-station rotary index welding machine uses automation methods to combine assembly and CO₂ shielded arc welding operations. It press assembles and contour welds flat circular plates to the inside of cylindrical parts at a rate of 500 finished assemblies an hour. The machine adapts to parts up to 5-in. in diam that require press type assembly



and circular weld joining. The index table is driven by a standard cam index drive. The five-station index table is of hollow aluminum construction. *Expert Welding Machine Co.*

For more data circle No. 50 on postcard, p. 97

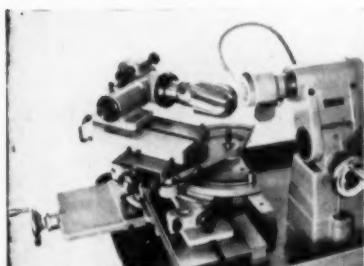
Contour cutter

On this contour machine the tool moves rather than the work. The contour band machine has a work capacity of 70 sq ft. It takes a straight cut 14½ ft long. It produces large, off-shape parts, by the stack if necessary. The work for which the unit is most ideally suited, says its manufacturer, is the machining of large dies. *The DoAll Co.*

For more data circle No. 51 on postcard, p. 97

Grinding mill

Precision built, this universal tool and cutter grinder sharpens milling cutters, cutter heads, single point turning tools, thread and hob milling cutters, carbide tipped tools, sidemilling cutters and end-mills. Special attachments allow it to adapt for sharpening reamers and



grinding of radii. It features an attachment for generating helix angles, so that helix fluted tools can be sharpened without use of a supporting finger. The helix can easily be set to any predetermined angle. *Hahn, Hallett & Willcutt Machinery Co.*

For more data circle No. 52 on postcard, p. 97

Sheet metal snip

For sheet metal work, a compound lever double-cut snip features a lower blade ground to a triangular reamer point for making a start cut. This eliminates need for a punched or drilled starting hole.



Powerful leverage makes cutting easy. The blade design with proper relief and shear avoids binding and the chip curls free. *Peck, Stow & Wilcox Co.*

For more data circle No. 53 on postcard, p. 97

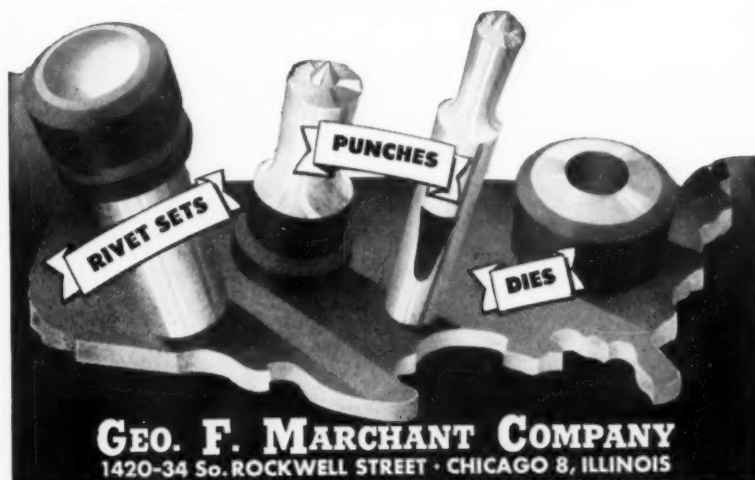
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For detailed information on any Alan Wood product, write Marketing Division, Dept. CR-S64.

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IRON PRODUCTS “Swede” pig iron	A.W. CUT NAILS Standard & Hardened
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ROLLED STEEL FLOOR PLATE A.W. ALGRIP abrasive A.W. SUPER- DIAMOND pattern COAL CHEMICALS	COKE Foundry, industrial & metallurgical PENCO METAL PRODUCTS DIVISION Steel cabinets, lockers & shelving



The Iron Age SUMMARY . . .

Steel market has good points as well as bad . . . Second quarter shaping up better than expected . . . Strong demand for plate, structurals, pipe, holding market together

Not So Bad . . . The prophets of doom are running for cover in steel this week. Steel sales people have weighed the good with the bad and come up with an encouraging picture. The outlook for second quarter adds up to relatively pleasant reading.

This appraisal of the steel market takes into account the easier demand from the automotive and appliance industries. The sheet market has been especially hard hit. But even here, there's a silver lining to the dark cloud: the situation can't get much worse.

Mills producing a good cross-section of steel products are more optimistic than those that lean heavily on sheets and strip. At least one major producer looks for his Pittsburgh area mills to operate at near-capacity in the second quarter. Present operating rate is well above capacity.

Strong Points . . . Continued strong demand for plate, structurals, and oil country goods is holding the market together. And there's no sign of a letup. At least three big mills have taken up the slack on their sheet-strip mills by rolling light plate. This has eased the light plate market, but it still has plenty of zip. Tinplate is an-

other product going well and likely to do even better in the months ahead.

Overall, shipments are running ahead of new orders. But for most mills the margin is close: Order volume is 90 to 100 pct of shipments.

In automotive, one of the Big Three is still playing it close to the vest. But the other two major producers are booking substantial tonnages. It looks as though the worst is over in the automakers' drive to cut back inventories.

A Prediction . . . While some observers are looking for a sharp downturn in the steel ingot rate in second quarter, an IRON AGE survey indicates that this is not likely. A rate close to 90 pct of capacity is indicated.

Here are a few of the strong spots in the economy to support an optimistic outlook in the months ahead:

(1) Heavy durable goods orders; (2) steel order backlogs are running ahead of a year ago; (3) auto sales outlook is better than a year ago; (4) new plant and equipment spending probably will live up to predictions of a 10 pct increase over 1956; (5) highway and construction activity is offsetting weakness in home building, and (6) farm equipment buying is picking up.

Steel Output, Operating Rates

	This Week	Last Week	Month Ago	Year Ago
Production				
(Net tons, 000 omitted)	2,484	2,509	2,488	2,425
Ingot Index				
(1947-1949=100)	154.6	156.2	155.4	151.0
Operating Rates				
Chicago	95.0	95.0	94.0	98.5
Pittsburgh	97.0	101.0*	100.0	103.0
Philadelphia	105.0	105.0	104.5	103.0
Valley	94.0	98.0*	97.0	97.0
West	101.5	101.5	102.5	98.0
Buffalo	95.0	105.0	105.0	105.0
Cleveland	93.0	96.0*	95.0	105.5
Detroit	106.0	106.0	102.0	93.0
S. Ohio River	93.0	90.0*	87.0	96.5
South	98.0	95.5	96.5	95.0
Upper Ohio R.	104.0	104.0	108.0	100.0
St. Louis	82.0	80.0	100.0	106.0
Northeast	76.0	76.0	31.0	85.0
Aggregate	97.0	98.0	97.5	98.5

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.663	5.661	5.622	5.174
Pig Iron (Gross Ton)	\$62.90	\$62.90	\$62.90	\$59.09
Scrap, No. 1 hvy (Gross ton)	\$52.17	\$53.33	\$55.50	\$47.83
Nonferrous				
Aluminum ingot	27.10	27.10	27.10	24.40
Copper, electrolytic	32.00	32.00	36.00	46.00
Lead, St. Louis	15.80	15.80	15.80	15.80
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	74.00	74.00	74.00	64.50
Tin, Straits, N. Y.	98.50	100.25*	102.50	104.75
Zinc, E. St. Louis	13.50	13.50	13.50	13.50

*Revised

Spring Steel, Wire Prices Up

Increases on c-r spring steel range up to \$14 a ton on one grade . . . Some wire product bases and extras are raised by major producers . . . Boiler tubing also up.

◆ **COLD-ROLLED** spring steel has joined the growing list of steel products being advanced in price.

Base price increases ranging up to \$14 a ton have been made by American Steel and Wire Div., U. S. Steel Corp., by Superior Steel Corp., Crucible Steel Co., and Acme Steel Co. Eastern producers raising prices were Thompson Wire Co., Newman Crosby Steel Co., John A. Roebling Sons Co., Wallingford Steel Co. and Wallace Barnes Steel Div.

Earlier announcements of similar price advances came from Dearborn Div. Sharon Steel Corp., and from Detroit Steel Corp. (New prices on p. 129.)

Other steel products are going to cost the user more. Seamless boiler tube has been increased by National Tube Div. of U. S. Steel and by Babcock & Wilcox (p. 129). New base prices and extra charges on some types of wire products have come from Pittsburgh Steel and Jones & Laughlin. Products affected include regular galvanized wire, high carbon, special purpose wire, and wire rods.

Base price increases reached another product category—rail and track accessories—when Bethlehem Steel announced increases averaging about 4 pct of the selling price of the products. Effective Feb. 26, the new prices in cents per lb are as follows: Standard tee rails 5.275, joint bars 6.60, tie plates 6.275, light tee rails 6.25, and girder rails 6.80.

Other new prices from Bethlehem in dollars per 100 lb are track bolts now \$13.85, screw spikes \$13.60 and track spikes \$9.225.

THE IRON AGE Finished Steel Composite, following these increases, rose to 5.663c.

Apparently the fact that a buyer's market exists in some steel

products isn't discouraging price hikes. It's more than offset by the pressure of rising production costs. Even products in easy supply, like butt-weld pipe, are not immune to price rises.

Meanwhile the flat-rolled market continues sluggish. Sheet and strip mills, unable to get enough April orders, are actively booking light plate tonnages.

SHEET AND STRIP . . . Market continues off. Automotive buying is still slack and appliance purchasers have slowed up on cold-rolled sheet ordering. Mills, with sheet and strip orders lagging, are booking light plate tonnages for April delivery.

At **Chicago** there's an encouraging sign in that one mill's flat-rolled bookings shot up 30 pct last week. Farm equipment makers in that area are requesting more steel. Automotive and warehouse buying is still slow. Hot-rolled products are moving better than cold-rolled.

Second quarter orders are coming in at a good rate, according to one **Pittsburgh** producer. However, the company has taken all quota restrictions off sheets. And same firm also is rolling plate on strip mills. Warehouse orders in this area are off, reflecting the availability of sheet from the mills.

Purchasing Agent's Checklist

- RESEARCH:** Westinghouse combines research and commercial production of alloys and castings at Blairsville p. 38
- PRODUCTION:** Titanium costs are coming in reach p. 40
- CONTROLS:** Scrap exports may escape a quota system p. 41
- PRODUCTION:** Major mills take up slack in cold-rolled sheet schedules by running light plate in coiled form p. 42

Cold-rolled sheet is easiest flat-rolled product at **Pittsburgh**, with hot-rolled sheet and cold-rolled strip a little better.

Some April sheet tonnage is still open on the books at **Cleveland**. Mills which had been accepting, but not soliciting, orders are now out beating the bushes. Automotive buyers are slow about placing orders.

A large producer at **Philadelphia** indicates customers should take 85-90 pct of tonnage offered for April. Same mill feels April will mark the low point in orders with customer interest reviving in May.

At **Detroit** demand for flat-rolled is slow and mills still have a surplus of time on their order books.

WIRE PRODUCTS . . . Farm area ordering of barbed wire and other merchant products at **Chicago** is running slightly below last year's level. In the South, below Cincinnati and Virginia, ordering is ahead of last year's levels.

Deliveries from **Cleveland** area are practically off the shelf on all standard merchant products. Manufacturers wire is available on relatively short delivery. Furniture builders are helping relieve the lag created by lack of automotive and appliance ordering.

However, the market is still slow in **Philadelphia** area with most items available on two weeks' delivery. Ordering during the first quarter was under last year's levels for the same period. Imported products, particularly barbed wire, are depressing the domestic market in the coastal area.

Orders for manufacturers wire are still off in the **Pittsburgh** area. Merchant wire products seem to be staging a comeback.

BAR . . . Hot-rolled bars are about as sluggish as sheet at **Pittsburgh**. One large mill has excess capacity and looks for the condition to continue in April.

Bar supply at **Detroit** is considered plentiful. At **Chicago** there's mild strength in hot-rolled bar, although cold finishers aren't feeling any equal increase in business.

Customers can just about specify their own delivery dates on cold-finished bar at **Philadelphia**. Hot-rolled bar is little better.

TINPLATE . . . **Pittsburgh** shipments of tinplate are running ahead of capacity production. Mills are in the process of installing coilers and related equipment. Shipments of product in coiled form should begin in late March.

Second quarter demand for the product is heavy at **Chicago**.

Comparison of Prices

(Effective Feb. 26, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 26 1957	Feb. 19 1957	Jan. 29 1957	Feb. 28 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	10.40
Stain's C-R strip (No. 302)	50.00	50.00	50.00	44.50

Tin and Terneplate: (per base box)				
Tinplate (1.60 lb.) cokes	\$9.95	\$9.95	\$9.95	\$9.05
Tin plates, electro (0.50 lb.)	8.65	8.65	8.65	7.75
Special coated mfg. ternes	9.20	9.20	9.20	7.85

Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.65¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	43.25	43.25	43.25	38.25
Wrought iron bars	11.50	11.50	11.50	11.50

Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.25¢

Rails: (per 100 lb.)				
Heavy rails	\$5.075-5.275	\$5.075	\$5.075	\$4.725
Light rails	6.00-6.25	6.00	6.00	5.65

Semifinish Steel: (per net ton)				
Re-rolling billets	\$74.00	\$74.00	\$74.00	\$68.50
Slabs, re-rolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00

Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225

Finished Steel Composite: (per pound)				
Base price	5.663¢	5.661¢	5.622¢	5.174¢

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

	Feb. 26 1957	Feb. 19 1957	Jan. 29 1957	Feb. 28 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	\$66.88	\$66.88	\$66.88	\$63.69
Foundry, Valley	63.00	63.00	63.00	59.00
Foundry, Southern Cin'ti	67.17	67.17	67.17	62.98
Foundry, Birmingham	59.00	59.00	59.00	58.00
Foundry, Chicago	63.00	63.00	63.00	59.00
Basic del'd Philadelphia	66.38	66.38	66.38	62.77
Basic Valley furnace	62.50	62.50	62.50	58.50
Malleable, Chicago	63.00	63.00	63.00	59.00
Malleable, Valley	63.00	63.00	63.00	59.00
Ferromanganese, cents per lb.	12.75¢	12.75¢	12.75¢	9.50¢
74 to 76 pct Mn base.				

Pig Iron Composite: (per gross ton)				
Pig iron	\$62.90	\$62.90	\$62.90	\$59.09

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	\$52.50	\$53.50	\$54.50	\$47.50
No. 1 steel, Phila. area	55.50	57.50	57.50	49.50
No. 1 steel, Chicago	48.50	49.00	51.50	46.50
No. 1 steel, Detroit	41.50	45.50	45.50	44.50
Low phos., Youngstown	53.50	53.50	57.50	53.50
No. 1 mach'y cast, Pittsburgh	56.50	56.50	59.00	55.50
No. 1 mach'y cast, Philadel'a	57.50	57.50	60.50	54.50
No. 1 mach'y cast, Chicago	50.50	50.50	53.50	50.50

Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	\$52.17	\$53.33	\$55.50	\$47.83

Coke, Connellsville: (per net ton at oven)				
Foundry coke, prompt	\$16.38	\$16.38	\$16.38	\$14.25
Foundry coke, prompt	\$17.50-\$19	\$17.50-\$19	\$17.50-\$19	\$16.25

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	32.00	32.00	36.00	46.00
Copper, Lake, Conn.	32.00	32.00	36.00	43.00
Tin, Straits, New York	98.50†	100.25*	102.50	104.75
Zinc, East St. Louis	13.50	13.50	13.50	13.50
Lead, St. Louis	16.80	16.80	16.80	16.80
Aluminum, virgin ingot	27.10	27.10	27.10	24.40
Nickel, electrolytic	74.00	74.00	74.00	64.50
Magnesium, ingot	36.00	36.00	33.00	33.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. * Revised.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

STAINLESS STEEL

← To identify producers, see Key on P. 128 →

Base price cents per lb f.o.b. mill

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. B6	64.50	65.00	65.50	66.00	
Birmingham R3	58.50	59.00*			
Birmingham W9	58.50	59.00*	63.00		
Birmingham U4	58.50	59.00*	63.00		
Buffalo R3	62.50	63.00	63.50	64.00	
Buffalo H1	62.50	63.00	63.50	64.00	
Buffalo W6	62.50	63.00	63.50	64.00	
Chester P2	64.50	65.00	65.50		
Chicago I4	62.50	63.00	63.00	63.50	
Cleveland A5	62.50	63.00	63.00	63.50	67.50†
Cleveland R3	62.50	63.00	63.00	63.50	
Duluth I4	62.50	63.00	63.00	63.50	67.50†
Erie I4	62.50	63.00	63.00	63.50	67.50†
Everett M6	65.00	65.50			
Fontana K1	70.50	71.00			
Geneva, Utah C7	62.50	63.00			
Granite City G2	64.40	64.90	65.40		
Hubbard Y1			63.00		
Lone Star L3	58.50	59.00			
Midland C11	62.50				
Minneapolis C6	64.50	65.00	65.50		
Monessen P6	62.50				
Neville Ia. P4	62.50	63.00	63.00	63.50	67.50†
N. Tonawanda T1	63.00	63.00	63.50	64.00	
Pittsburgh U1	62.50	63.00	63.00	63.50	
Sharpville S3	62.50	63.00	63.00	63.50	
Sa. Chicago R3	62.50	63.00	63.00		
Swedeland A2	62.50	63.00	63.50	65.50	
Toledo J4	62.50	63.00	63.00	63.50	
Troy, N. Y. R3	64.50	65.00	65.50	66.00	70.50
Youngstown Y1			63.00	63.50	

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, \$2 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional 0.25 pct nickel. * Add \$1.00 for 0.31-0.69 pct phos. † Intermediate low phos. ‡ Add \$1.00 for 0.31 to 0.50 pct phos.

Silvery Iron: Buffalo, H1, \$72.50; Jackson, J1, 14 (Globe Div.), \$71.50; Niagara Falls (15.01-15.50), \$99.50; Keokuk (14.01-14.50), \$110.00; (15.51-16.00), \$105.00. Add \$1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add 75¢ for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron under 10 pct phos., \$64.00. Add \$1.00 premium for all grades silvery 6 pct to 14 pct.

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingot, re-rolling	21.25	22.75	22.25	24.25	—	26.00	38.25	31.00	35.50	—	16.60	27.75	16.25
Slabs, billets	26.00	29.00	27.00	30.25	30.75	32.00	47.50	38.50	44.75	—	20.75	—	21.00
Billets, forging	—	35.00	35.75	36.50	39.50	39.00	59.75	45.25	53.50	30.75	27.25	27.75	27.75
Bars, struct.	40.50	41.25	42.50	43.25	46.25	46.00	70.25	53.25	62.25	36.25	32.50	33.00	33.00
Plates	42.50	43.25	44.50	45.50	48.00	48.75	73.75	57.50	67.00	38.75	33.75	35.50	34.50
Sheets	46.75	47.25	49.25	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Strip, hot-rolled	34.50	37.50	35.75	39.00	—	42.50	66.50	51.50	61.00	—	29.75	—	30.75
Strip, cold-rolled	43.25	47.25	45.75	50.00	—	53.25	78.25	63.00	76.25	46.50	38.75	46.50	39.25
Wire CF: Rod HR	—	39.25	40.25	41.00	44.00	43.75	66.75	50.50	59.25	34.50	31.00	31.50	31.50
			40.50	41.25			67.00	51.00	59.50				

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., C11; Brackenridge, Pa., A3; Butler, Pa., A7; Vandergrift, Pa., U1; Washington, Pa., W2, J2; Baltimore, El; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4; Philadelphia, D5.

Strip: Midland, Pa., C11; Waukegan, Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., F1; Reading, Pa., C2; Washington, Pa., W2; W. Leeburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Harrison, N. J., D3; Youngstown, C3; Sharon, Pa., S1; Butler, Pa., A7; Wallingford, Conn., U3 (plus further conversion extras); W1; New Bedford, Mass. (.25¢ per lb higher), R6; Gary, U1 (.25¢ per lb higher).

Bar: Baltimore, A7; S. Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; S. Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T3; Ft. Wayne, J4; Philadelphia, D5; Detroit, R5; Gary, U1.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Syracuse, C11; Bridgeville, U2.

Structurals: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11; S. Chicago, U1.

Plates: Brackenridge, Pa., A3; Chicago, U1; Munhall, Pa., U1; Midland, Pa., C11; New Castle, Ind., J2; Middletown, A7; Washington, Pa., J2; Cleveland, Massillon, R3; Coatesville, Pa., C15; Philadelphia, D5; Vandergrift, Pa., U1; Gary, U1.

Forging billets: Midland, Pa., C11; Baltimore, A7; Washington, Pa., J2; McKeesport, F1; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, U1; Syracuse, C11; Detroit, R5; Munhall, Pa., S. Chicago, U1.

Market Downtrend Resumes

Crack in eastern market leads downtrend . . . Firming tendencies in Chicago fail to hold in Midwest . . . Automotive lists are also off moderately . . . Export down.

◆ THE DOWNWARD escalator of the scrap market resumed this week. A somewhat accelerated pace followed last week's pause and, for the most part, further declines appear in the cards.

The eastern market, which had held firm, fell off significantly. Chicago's firming tendency of a week ago failed to hold. The floor there may be close, but no rebounding is expected. Automotive lists were off slightly, although not enough to cause any real panic.

"Definitely a buyer's market," said one eastern dealer. But the falling prices are contrasted to the fact that there is no real abundance of good scrap.

In many markets, major consumers are out of the market. In others, they are taking in only enough to keep their inventories comfortable.

But scrap is still high enough to prompt mills to keep their blast furnaces going at full capacity to provide as much hot metal as possible. This is keeping the turnings market relatively high in most areas.

The Pittsburgh market, which has also held at a comparatively higher level than the Midwest, also showed signs of cracking further.

Expected lower operating rates in the second quarter appear to be the big factor in the sharp decline. Even though scrap is not too plentiful, few dealers want to gamble on holding inventories.

On the strong side, Midwest brokers are showing some signs of hesitation before covering orders. Significant declines are not expected by everyone, but the market maintains a bearish tone.

Pittsburgh . . . On the basis of early industrial lists, prices of most scrap grades dropped \$1 in Pittsburgh. No. 2 bundles slipped \$3 to a \$43 level and small quantities have been bought under this figure. Low phos is off \$1 in sympathy with industrial grades. The general slide came after broker attempts to buy at reduced prices had met with little success. Lack of mill activity had been balanced by slow collections.

Chicago . . . In a confused market, prices slipped slightly, but with only small tonnages moving. Big cloud is the expected entry of at least one consumer with offers to buy at \$1 to \$2 under going prices. But scrap is in extremely low supply; mill inventories have been sinking in the past 30 days in a number of cases; and brokers who are short hesitate to write new orders in the face of what may be a rising market. An increasing pinch has already been felt by many brokers.

Philadelphia . . . Price of primary steelmaking grades dropped \$2 and secondary grades followed with a \$1.50 drop. Further softening materialized in railroad specialties, off \$2, and low phos items, down \$1. The market continued to weaken even though export activity resumed this week. Contributing to the weakness was the fact that two large mills pulled out of the market. Cast grades held the price line but showed signs of weakening in the face of strikes in several area foundries.

New York . . . This market is in the doldrums. The tugboat strike has dammed export business almost completely and domestic orders are not forthcoming. In face of no significant tonnage orders from domestic consumers, steelmaking and blast furnace grades are off \$2 on appraisal. Brokers and dealers concur that anyone soliciting business would have to allow this drop to find any takers.

Detroit . . . Steelmaking grades dropped \$1 on appraisal. Bids on the

major auto lists closing this week were off an average of \$2 from last month. Average price for industrial bundles was \$48. Big factor in the lower prices is current speculation that the steelmaking rate will be lower in the second quarter. The local market is quiet.

Cleveland . . . Largest automotive lists closing this week brought a range of from \$48 to \$50 for No. 1 bundles. Lists were split among the three major brokers bidding. Estimated tonnage for March is 25,000 tons, about the same as January. With continued high operations in Cleveland and the Valley, some major deals should materialize in the near future. At present there is no major order out in the area.

Birmingham . . . The market in this district is also in the doldrums. Most consumers are buying only to replenish comfortable inventories. Despite this lack of orders, most dealers say they are unable to build up their own inventories due to the fact that suppliers are unwilling to accept present prices. Only nominal amounts are coming into the yards.

St. Louis . . . Recent lower prices continue to slow movement of scrap and dealers are content to complete unfilled orders. Otherwise, there is little new business. Railroad lists include only small amounts that must be moved. Prices are generally unchanged.

Cincinnati . . . The market continued routine with no break expected until announcement of March buying program by area mills. Foundry activity is quiet, but with shipments steady. New steelmaking furnaces in the area are boosting scrap consumption steadily this year.

Buffalo . . . Prices remain unchanged in an inactive market. Dealers are concentrating on filling old orders for shipment. Springlike weather has spurred the flow of scrap to the yards, but supplies are still scanty. Foundry market is also unchanged, after a slight drop. One major mill here is idle because of a strike.

Boston . . . No. 1 grades are off \$1. Market activity is slow, with no export at the moment. New England mills are out of the market for the most part, contributing to the general slowness of the market.

West Coast . . . Prices in the three Coast ports are soft. Some 700 to 800 cars of scrap are tied up awaiting shipment to Japan.



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Scrap Prices (Effective Feb. 26, 1957)

Pittsburgh

No. 1 hvy. melting	\$52.00 to \$53.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 dealer bundles	52.00 to 53.00
No. 1 factory bundles	55.00 to 56.00
No. 2 bundles	42.00 to 43.00
No. 1 busheling	52.00 to 53.00
Machine shop turn.	37.00 to 38.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	41.00 to 42.00
Cast iron borings	41.00 to 42.00
Low phos. punch'g's plate	55.00 to 57.00
Heavy turnings	47.00 to 48.00
No. 1 RR. hvy. melting	55.00 to 56.00
Scrap rails, random lgth.	68.00 to 69.00
Rails 2 ft. and under	71.00 to 72.00
RR. steel wheels	68.00 to 69.00
RR. spring steel	68.00 to 69.00
RR. couplers and knuckles	68.00 to 69.00
No. 1 machinery cast.	56.00 to 57.00
Cupola cast.	49.00 to 50.00
Heavy breakable cast.	47.00 to 48.00

Chicago

No. 1 hvy. melting	\$48.00 to \$49.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 dealer bundles	48.00 to 49.00
No. 1 factory bundles	53.00 to 54.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	48.00 to 49.00
Machine shop turn.	33.00 to 34.00
Mixed bor. and turn.	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Low phos. forge crops	59.00 to 60.00
Low phos. punch'g's plate	55.00 to 56.00
Low phos. 3 ft. and under	54.00 to 55.00
No. 1 RR. hvy. melting	54.00 to 55.00
Scrap rails, random lgth.	62.00 to 63.00
Revolving rails	65.00 to 66.00
Rails 2 ft. and under	66.00 to 67.00
Locomotive tires cut	57.00 to 58.00
Cut bolsters & side frames	57.00 to 58.00
Angles and splice bars	62.00 to 63.00
RR. steel car axles	77.00 to 78.00
RR. couplers and knuckles	56.00 to 57.00
No. 1 machinery cast.	50.00 to 51.00
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	43.00 to 44.00
Cast iron brake shoe	42.00 to 43.00
Cast iron wheels	52.00 to 53.00
Malleable	62.00 to 63.00
Stove plate	43.00 to 44.00
Steel car wheels	56.00 to 57.00

Philadelphia Area

No. 1 hvy. melting	\$55.00 to \$56.00
No. 2 hvy. melting	47.00 to 48.50
No. 1 dealer bundles	55.00 to 56.00
No. 2 bundles	46.00 to 47.00
No. 1 busheling	55.00 to 56.00
Machine shop turn.	41.00 to 42.00
Mixed bor. short turn.	43.00 to 44.00
Cast iron borings	43.00 to 44.00
Shoveling turnings	45.00 to 46.00
Clean cast chem. borings	49.00 to 50.00
Low phos. 5 ft. and under	61.00 to 62.00
Low phos. 2 ft. and under	62.00 to 63.00
Low phos. punch'g's	63.00 to 64.00
Elec. furnace bundles	60.00 to 61.00
Heavy turnings	52.00 to 54.00
RR. steel wheels	68.00 to 69.00
RR. spring steel	68.00 to 69.00
Rails 18 in. and under	74.00 to 75.00
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	55.00 to 56.00
Cast iron car wheels	61.00 to 62.00
Malleable	65.00 to 66.00
Unstripped motor blocks	41.00 to 42.00
No. 1 machinery cast.	57.00 to 58.00

Cleveland

No. 1 hvy. melting	\$49.00 to \$50.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 dealer bundles	49.00 to 50.00
No. 1 factory bundles	50.00 to 51.00
No. 2 bundles	38.00 to 39.00
No. 1 busheling	49.00 to 50.00
Machine shop turn.	32.00 to 33.00
Mixed bor. and turn.	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	35.00 to 36.00
Cut struct'l & plates, 2 ft. & under	57.00 to 58.00
Drop forge flashings	49.00 to 50.00
Low phos. punch'g's plate	51.00 to 52.00
Foundry steel, 2 ft. & under	53.00 to 54.00
No. 1 RR. heavy melting	56.00 to 57.00
Rails 2 ft. and under	73.00 to 74.00
Rails 18 in. and under	74.00 to 75.00
Railroad grate bars	39.00 to 40.00
Steel axle turnings	37.00 to 38.00
Railroad cast.	54.00 to 55.00
No. 1 machinery cast.	54.00 to 55.00
Stove plate	51.00 to 52.00
Malleable	57.00 to 58.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 dealer bundles	51.00 to 52.00
No. 2 bundles	42.00 to 43.00
Machine shop turn.	31.00 to 32.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	36.00 to 37.00
Low phos. plate	53.00 to 54.00

Buffalo

No. 1 hvy. melting	\$51.00 to \$52.00
No. 2 hvy. melting	44.00 to 45.00
No. 1 busheling	51.00 to 52.00
No. 1 dealer bundles	51.00 to 52.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	32.00 to 33.00
Low phos. plate	56.00 to 57.00
Scrap rails, random lgth.	63.00 to 64.00
Rails 2 ft. and under	67.00 to 68.00
RR. steel wheels	58.00 to 59.00
RR. spring steel	58.00 to 59.00
RR. couplers and knuckles	58.00 to 59.00
No. 1 machinery cast.	49.00 to 50.00
No. 1 cupola cast.	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$44.00 to \$45.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	44.00 to 45.00
No. 2 bundles	35.50 to 36.50
New busheling	44.00 to 45.00
Drop forge flashings	43.50 to 44.50
Machine shop turn.	28.00 to 29.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	31.00 to 32.00
Low phos. punch'g's plate	44.00 to 45.00
No. 1 cupola cast.	51.00 to 52.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	\$47.00 to \$48.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 dealer bundles	47.00 to 48.00
No. 2 bundles	38.00 to 39.00
Machine shop turn.	32.00 to 34.00
Cast iron borings	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
No. 1 RR. hvy. melting	54.00 to 55.00
Rails, random lengths	55.00 to 56.00
Rails 18 in. and under	65.00 to 66.00
Locomotive tires uncut	53.00 to 54.00
Angles and splice bars	57.00 to 58.00
Std. steel car axles	70.00 to 71.00
RR. specialties	57.50 to 58.50
Cupola cast.	44.00 to 45.00
Heavy breakable cast.	40.00 to 41.00
Cast iron brake shoes	49.00 to 50.00
Stove plate	41.00 to 42.00
Cast iron car wheels	47.00 to 48.00
Revolving rails	63.00 to 64.00
Unstripped motor blocks	40.00 to 41.00

Boston

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$46.00 to \$47.00
No. 2 hvy. melting	36.50 to 37.50
No. 1 dealer bundles	46.00 to 47.00
No. 2 bundles	35.00 to 36.00
No. 1 busheling	46.00 to 47.00
Elec. furnace, 3 ft. & under	50.50 to 51.50
Machine shop turn.	30.00 to 31.00
Mixed bor. and short turn.	32.50 to 33.50
Shoveling turnings	32.00 to 33.00
Clean cast chem. borings	34.00 to 35.00
No. 1 machinery cast.	47.00 to 48.00
Mixed cupola cast.	41.50 to 42.50
Heavy breakable cast.	46.00 to 47.00
Stove plate	41.00 to 42.00
Unstripped motor blocks	33.00 to 34.00

New York

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$49.00 to \$50.00
No. 2 hvy. melting	41.00 to 42.00
No. 2 dealer bundles	38.00 to 39.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	34.00 to 35.00
Clean cast chem. borings	33.00 to 34.00
No. 1 machinery cast.	49.00 to 50.00
Mixed yard cast.	45.00 to 46.00
Charging box cast.	46.00 to 47.00
Heavy breakable cast.	49.00 to 50.00
Unstripped motor blocks	37.00 to 38.00

Birmingham

No. 1 hvy. melting	\$43.00 to \$44.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 dealer bundles	43.00 to 44.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	43.00 to 44.00
Machine shop turn.	34.00 to 35.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	27.00 to 28.00
Electric furnace bundles	50.00 to 51.00
Bar crops and plate	55.00 to 56.00
Structural and plate, 2 ft.	54.00 to 55.00
No. 1 RR. hvy. melting	49.00 to 50.00
Scrap rails, random lgth.	65.00 to 66.00
Rails, 18 in. and under	65.00 to 66.00
Angles & splice bars	59.00 to 60.00
Revolving rails	64.00 to 65.00
No. 1 cupola cast.	50.00 to 51.00
Stove plate	50.00 to 51.00
Charging box cast.	40.00 to 41.00
Cast iron car wheels	42.00 to 43.00
Unstripped motor blocks	42.00 to 43.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 2 ft. & under	48.00 to 49.00

Cincinnati

Brokers buying prices per gross ton, on cars:	
No. 1 hvy. melting	\$48.50 to \$49.50
No. 2 hvy. melting	41.50 to 42.50
No. 1 dealer bundles	48.50 to 49.50
No. 2 bundles	36.50 to 37.50
Machine shop turn.	34.00 to 35.00
Mixed bor. and turn.	33.50 to 34.50
Shoveling turnings	37.00 to 38.00
Cast iron borings	33.50 to 34.50
Low phos. 18 in. & under	55.00 to 56.00
Rails, random lengths	63.00 to 64.00
Rails, 18 in. and under	73.00 to 74.00
No. 1 cupola cast.	49.00 to 50.00
Hvy. breakable cast.	46.00 to 47.00
Drop broken cast.	56.00 to 57.00

San Francisco

No. 1 hvy. melting	\$56.00
No. 2 hvy. melting	50.00
No. 1 dealer bundles	54.00
No. 2 bundles	38.00
Machine shop turn.	35.00
Cast iron borings	35.00
No. 1 RR. hvy. melting	55.00
No. 1 cupola cast.	60.00

Los Angeles

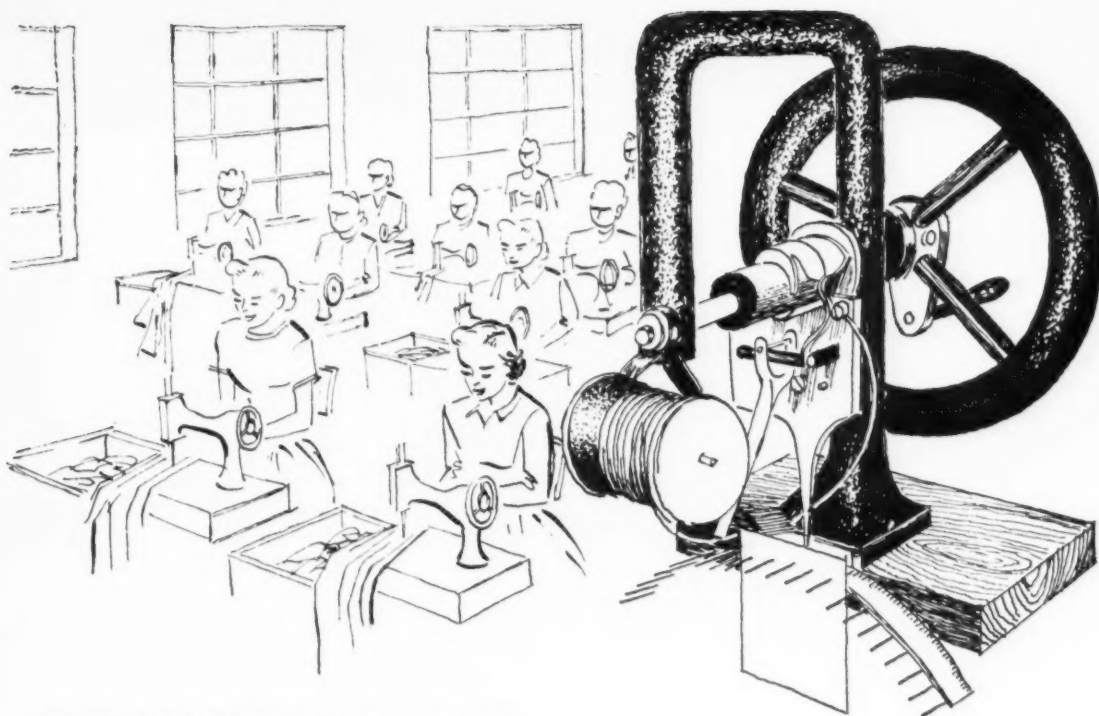
No. 1 hvy. melting	\$56.00
No. 2 hvy. melting	51.00
No. 1 dealer bundles	54.00
No. 2 bundles	34.00
Machine shop turn.	35.00
Shoveling turnings	37.00
Cast iron borings	34.00
Elec. furn. 1 ft. and under (foundry)	66.00
No. 1 RR. hvy. melting	55.00
No. 1 cupola cast.	\$57.00 to 58.00

Seattle

No. 1 hvy. melting	\$55.00
No. 2 hvy. melting	51.00
No. 2 bundles	\$31.00 to 34.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton Ont.

No. 1 hvy. melting	\$50.00
No. 2 hvy. melting	44.00
No. 1 dealer bundles	50.00
No. 2 bundles	38.00
Mixed steel scrap	42.00
Busheling	36.00
Bush, new fact., prep'd.	48.00
Bush, new fact., unprep'd	48.00
Machine shop turn.	34.00
Short steel turn.	31.00
Mixed bor. and turn.	25.00
Rails, rerolling	56.00
Cast scrap	50.00



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Forecasting The Tin Price

New York tin trader says it's possible to predict forward prices, sometimes . . . Out-of-line relationships on world markets can indicate a trend.

◆ **CONFESSION** of a major New York tin trader: "Back in December I predicted the spot tin price in March would hit \$1.13 per pound. This just shows how wrong you can be." (Current price is a shade under \$1 with indications of more weakness.)

But, he hastens to add, there are some valid ways of forecasting the movement of future tin. For one thing, there are certain normal relationships in the world tin market. When they go out of line they indicate a trend.

One such case occurred in February. For most of the month,

Here is how the New York price of tin for May delivery compared to the cost at Singapore (settlement price plus about 4½¢ expenses) in February. Dates are first day of trading each week. Lower New York price means both will probably fall.

	cents	N. Y. price	Singapore
	per lb.	May delivery plus expenses	
Feb. 4	97.50		98.53
Feb. 11	96.625		97.80
Feb. 18	96.50		96.39
Feb. 25	95.75		95.875

three-month tin was cheaper in New York than it would cost from Singapore. The result: a gradual decline of prices at both places. New York price went from 97.50 cents per lb., to about 95.75. Cost from Singapore dropped from 98.53 cents per lb., to about 95.875.

The rule of thumb: When N. Y. price of tin for three-months' delivery is less than 4½¢ to 4¾¢ above the current settlement price at Singapore the market is weak and future prices will drop.

Here's how and why it works. Singapore tin is about half the

world supply. The amount sold each day depends on the amount of tin ore and concentrates taken the previous day by the selling smelters.

The lowest sealed bid accepted sets the price all buyers will pay at Singapore. Tin for subsequent resale in the U. S. will arrive at New York in about three months. About 4½¢ to 4¾¢ per pound must be figured in for shipping, insurance, financing, weighing and entry fee at New York.

The total—tin plus expenses—sets the competitive level at New York any given day.

The other half of the world tin comes, for the most part, from smelters in Holland, England, Belgium and Germany. Delivery time is shorter, permitting more flexible marketing.

If New York traders and buyers are able to get enough tin from these and other sources, for three-

months delivery, at a price below the delivered price from Singapore, it indicates a weakness in the market. It means bids at Singapore, and prices at New York, are headed down.

Another factor indicating price movement and direction is the fact that freight between London and New York is 2¢ per lb. of tin. When the spread varies from this differential, one market is about to shift. More times than not the lower market will move up to prevent tin from leaving that market. However, if there are more sellers than buyers, and the lower market does not move promptly, tin will begin to move and drive the higher price down. The reason: margin of profit for tin traders is too small, normally, to permit lengthy storage.

ALUMINUM . . . The Aluminum industry, which has gradually been gaining new markets through most of its brief history, is now in danger of losing one. A number of close observers believe that aluminum will lose its military aircraft market in 10 to 15 years. The reason: higher speeds would require metals which stand up better under high friction.

The industry is not conceding this market. Said an executive of one of the major aluminum producers: "The situation is a great deal more favorable than is most generally indicated. Aluminum alloys currently in use show excellent properties up to 450° F." He also confided that alloys now in the laboratory and experimental stages show "considerable promise" at temperatures as high as 650°. For higher than that he felt aluminum powder metallurgy held the answer in many cases.

Another possible solution being investigated is the development of new, more efficient methods of cooling heat affected areas.

The Aluminum Assn. reports primary output in January was 147,030 short tons. This was down from the 148,391 tons turned out the previous month. But it easily topped the 140,394 tons output for January 1956. Drop was not significant. Revised reports say output last period 1956 was all-time record for a quarter.

Tin Prices for the week: Feb. 20—100.00; Feb. 21—99.00; Feb. 25—98.50; Feb. 26—98.50.*

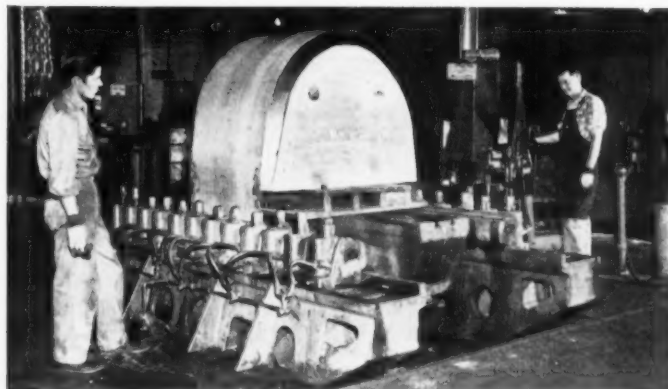
* Estimate.

Primary Prices

cents per lb)	Current price	last price	date of change
Aluminum Ingot	27.10	25.90	8/10/56
Aluminum pig	25.00	24.00	8/10/56
Copper (E)	32.00	34.00	2/18/57
Copper (CS)	31.00	32.00	2/20/57
Copper (L)	32.00	34.00	2/19/57
Lead, St. L.	15.80	16.30	1/13/56
Lead, N. Y.	16.00	16.50	1/13/56
Magnesium Ingot	38.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/56
Titanium sponge	250-275	270-300	12/4/56
Zinc, E. St. L.	13.50	13.00	1/6/56
Zinc, N. Y.	14.00	13.50	1/6/56

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig. Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see column at right, other primary prices, pg. 124.

"In titanium stretch-forming, Mallory-Sharon material most consistent we have tried; simplifies fabrication"



1. Initial forming of titanium sheet at Hart Metal for jet engine pod. Since Mallory-Sharon titanium is certified in a definite strength range, springback is predictable, and allowed for in dies.



2. Formed sheet is annealed to relieve stress. With sheet material in a consistent strength range, Hart Metal reports that two or three stress relieving operations are eliminated.

MALLORY  SHARON

MALLORY-SHARON TITANIUM CORPORATION • NILES, OHIO

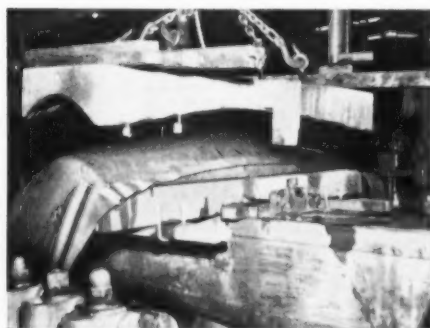


Producers of titanium and titanium alloy sheet, strip, plate, rod, bar, billets

...reports

Hart Metal Products

● Because of titanium's springback characteristics, uniformity is particularly important in simplifying forming. Here, Mallory-Sharon sheet is preferred material for its consistent properties, the result of strict quality control. Each heat of Mallory-Sharon commercially pure titanium is certified for average strength and limits. For dependable quality, call us for your requirements, and for technical help in application.



3. Double contour produced by stretch-forming. Heated dies aid in obtaining desired shape with minimum number of operations.



4. Formed skins are checked in fixture and given final inspection. Fabricator reports very low scrap loss with uniform strength material.

Nonferrous Prices (Effective Feb. 26, 1957)

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3.
1800, 1100, 3003.....	44.3	42.1	40.9	40.2
5052.....	51.8	46.8	45.1	42.9
6061-0.....	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8.....	45.5-47.3	61.3-65.1
12-14.....	46.2-47.7	62.2-66.8
24-26.....	49.4-49.5	73.1-77.8
36-38.....	58.3-59.0	97.4-101.0

Screw Machine Stock—2011-T-3

Size"	1/4	3/8-5/8	3/4-1	1 1/4-1 1/2
Price.....	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
#19 gage.....	\$1.352	\$1.803	\$2.254	\$2.704
#24 gage.....	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type→	Gage→	250-3.00	250-2.00	.188	.081	.032
AZ31B Stand, Grade.....		67.9	69.0	77.9	103.1	
AZ31B Spec.....		93.3	95.7	108.7	171.3	
Tread Plate.....		70.6	71.7			
Tooling Plate.....	73.0					

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C).....	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B).....	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR.....	126	106	128
Strip, CR.....	124	108	128
Rod, bar, HR.....	107	89	109
Angles, HR.....	107	89	109
Plates, HR.....	120	105	121
Seamless tube.....	157	129	260
Shot, blocks.....		87	

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper.....	54.13	.....	51.36	54.32
Brass, 70/30.....	47.52	48.06	47.46	50.43
Brass, Low.....	50.20	50.74	50.14	53.01
Brass, R L.....	51.14	51.68	51.08	53.95
Brass, Naval.....	51.09	.....	46.00	55.10
Muntz Metal.....	49.79	.....	45.60	.....
Comm. Bz.....	52.63	53.17	52.57	55.19
Mang. Bz.....	55.43	.....	49.53	.....
Phos. Bz. 5%.....	73.17	.....	73.67	.....

Free Cutting Brass Rod..... \$37.68

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, \$11.00-\$12.10; alloy, \$14.75; Plate, HR, commercially pure, \$9.25-\$9.75; alloy, \$11.25. Write, rolled and/or drawn, commercially pure, \$8.50-\$9.00; alloy, \$11.00; Bar, HR or forged, commercially pure, \$7.10-\$7.35; alloy, \$7.10-\$7.30; billets, HR, commercially pure, \$6.86-\$7.10; alloy, \$6.86-\$7.05.

PRIMARY METAL

(Cents per lb, unless otherwise noted)
Antimony, American, Laredo, Tex.... 33.50
Beryllium aluminum 5% Be, Dollar per lb contained Be.....\$74.75
Beryllium copper, per lb contain'd Be.\$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading.....\$71.50
Bismuth, ton lots.....\$ 2.25
Cadmium, del'd.....\$ 1.70
Calcium, 99.9%, small lots.....\$ 4.55
Chromium, 99.8%, metallic basis.....\$ 1.31
Cobalt, 97-99% (per lb).....\$2.00 to \$2.07
Germanium, per gm, f.o.b. Miami, Okla., refined.....\$48.50-\$53.50
Gold, U. S. Treas., per troy oz.....\$35.00
Indium, 99.9% dollars per troy oz.....\$ 2.25
Iridium, dollars per troy oz.....\$90 to \$100
Lithium, 98%.....\$11.00 to \$14.00
Magnesium, sticks, 100 to 500 lb..... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York.....\$255 to \$257
Nickel oxide sinter at Copper Cliff, Ont., contained nickel..... 71.25
Palladium, dollars per troy oz.....\$23 to \$24
Platinum, dollars per troy oz.....\$98 to \$101
Rhodium.....\$120.00 to \$125.00
Silver ingots (6 per troy oz.)..... 91.375
Thorium, per kg.....\$43.00
Uranium, normal per kg.....\$40.00
Vanadium.....\$ 3.45
Zirconium sponge.....\$10.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot.....	31.50
No. 115.....	30.00
No. 120.....	28.50
No. 123.....	33.50
80-10-10 ingot.....	33.50
No. 305.....	33.50
No. 315.....	42.25
88-10-2 ingot.....	40.00
No. 210.....	35.50
No. 245.....	25.25
Yellow ingot.....	25.25
No. 405.....	28.50
Manganese bronze.....	
No. 421.....	

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys.....	24.50-25.50
0.30 copper max.....	24.25-25.25
0.60 copper max.....	23.75-24.75
Piston alloys (No. 122 type).....	22.00-23.00
No. 12 alum. (No. 2 grade).....	22.00-23.00
108 alloy.....	24.00-25.75
195 alloy.....	24.25-25.25
13 alloy (0.60 copper max.).....	22.00-23.00
ANS-679.....	

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1-95-97 1/2%.....	22.75-23.75
Grade 2-92-95%.....	21.25-22.00
Grade 3-90-92%.....	20.50-21.50
Grade 4-85-90%.....	19.75-20.50

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper.....	28	27 1/4
Yellow brass.....	21 1/8	20 1/8
Red brass.....	25	24 1/4
Comm. bronze.....	25 1/8	25 1/4
Mang. bronze.....	20 1/2	19 3/4
Yellow brass rod ends.....	21 1/2	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire.....	26
No. 2 copper wire.....	24 1/2
Light copper.....	22 1/4
*Refinery brass.....	23
Copper bearing material.....	22 1/2
*Dry copper content.....	

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire.....	26
No. 2 copper wire.....	24 1/2
Light copper.....	22 1/4
No. 1 composition.....	23 1/2
No. 1 comp. turnings.....	22 1/2
Hvy. yellow brass solids.....	16
Brass pipe.....	17
Radiators.....	16 1/2

Aluminum

Mixed old cast.....	14 1/2-15
Mixed new clips.....	16 1/2-16 3/4
Mixed turnings, dry.....	14-15

Dealer's Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire.....	22 1/2-23
No. 2 copper wire.....	21-21 1/2
Light copper.....	19-19 1/2
Auto radiators (unsweated).....	15-15 1/2
No. 1 composition.....	20 1/2-21
No. 1 composition turnings.....	20-20 1/2
Cocks and faucets.....	16-16 1/2
Clean heavy yellow brass.....	14-14 1/2
Brass pipe.....	16 1/2-17
New soft brass clippings.....	18 1/2-19
No. 1 brass rod turnings.....	15 1/2-16

Aluminum

Alum. pistons and struts.....	5-5 1/2
Aluminum crankcases.....	10-10 1/2
1100 (2S) aluminum clippings.....	13 1/4-14
Old sheet and utensils.....	10-10 1/2
Borings and turnings.....	6 1/2-7
Industrial castings.....	10-10 1/2
2024 (24S) clippings.....	11 1/2-12

Zinc

New zinc clippings.....	6 1/2-7
Old zinc.....	4 1/2-5
Zinc routings.....	2 1/2-2 3/4
Old die cast scrap.....	2 1/2-2 1/2

Nickel and Monel

Pure nickel clippings.....	\$1.75-\$1.85
Clean nickel turnings.....	\$1.50-\$1.60
Nickel anodes.....	\$1.75-\$1.85
Nickel rod ends.....	\$1.75-\$1.85
New Monel clippings.....	80-85
Clean Monel turnings.....	75
Old sheet Monel.....	75-80
Nickel silver clippings, mixed.....	21
Nickel silver turnings, mixed.....	18

Lead

Soft scrap lead.....	12-12 1/2
Battery plates (dry).....	6 1/2-6 3/4
Batt-ries, acid free.....	3 3/4-4

Miscellaneous

Block tin.....	75-76
No. 1 pewter.....	59-60
Auto babbitt.....	39-40
Mixed common babbitt.....	12-12 1/2
Solder joints.....	17 1/2-18
Siphon tops.....	42
Small foundry type.....	14 1/4-14 1/2
Monotype.....	14-14 1/2
Lino. and stereotype.....	13-13 1/2
Electrotype.....	12 1/2-12 3/4
Hand picked type shells.....	9 1/2-10
Lino. and stereo. dross.....	4 1/2-5
Electro. dross.....	4-4 1/4

IRON AGE

STEEL
PRICES(Effective
Feb. 26, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	BILLETS, BLOOMS, SLABS			PIL- ING	SHAPES STRUCTURALS			STRIP					
	Carbon Re-rolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Hot- rolled	Cold- rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
EAST	Bethlehem, Pa.		\$107.00 B3		5.05 B3	7.40 B3	5.05 B3						
	Buffalo, N. Y.	\$74.00 B3, R3	\$91.50 B3, R3	\$107.00 B3, R3	5.90 B3	5.05 B3	7.40 B3	5.05 B3	4.675 B3, R3	6.85 R7	6.95 B3		
	Claymont, Del.												
	Harrison, N. J.												14.55 C11
	Conshebeck, Pa.		\$96.50 A2	\$114.00 A2				4.725 A2	6.90 A2	6.95 A2			
	New Bedford, Mass.								7.30 R6				
	Johnstown, Pa.	\$74.00 B3	\$91.50 B3	\$107.00 B3		5.05 B3	7.40 B3						
	Boston, Mass.								7.40 T8				14.90 T8
	New Haven Conn.								7.30 D1				
	Baltimore, Md.								6.85 T8				
	Phoenixville, Pa.				5.85 P2		5.85 P2						
	Sparrows Pt., Md.							4.675 B3		6.95 B3			
MIDDLE WEST	Bridgeport, Wallingford, Conn.	\$79.00 N8	\$96.50 N8	\$107.00 N8					7.30 W1 6.95 N8				
	Pawtucket, R. I. Worcester, Mass.								7.41 A5,N7				14.90 N7
	Alton, Ill.							4.875 L1					
	Ash and, Ky.							4.875 A7					
	Canton-Massillon, Deyar, Ohio		\$94.00 R3	\$107.00 R3, T3					6.85 G4		10.10 G4		14.55 G4
	Chicago, Ill. Franklin Park, Ill.	\$74.00 U1, R3	\$91.50 U1, R3,W8	\$107.00 U1, R3,W8	5.90 U1	5.00 U1,W8 5.50 P13	7.35 U1,Y1 6.80 W8	5.00 U1	4.675 N4 4.675 A1	6.95 A1,T8		7.75 W8 S9	14.55 A1, S9,T8
	Cleveland, Ohio								6.85 A5,J3			7.75 J3	
	Detroit, Mich.			\$107.00 R5				4.775 G3, M2	6.95 M2,G3, D2,P11	7.05 G3	10.10 G3, D2	7.75 G3	
	Anderson, Ind.								6.85 G4		10.10 G4		
	Duluth, Minn.												
	Gary, Ind. Harbor, Indiana	\$74.00 U1	\$91.50 U1	\$107.00 U1, Y1	5.90 J3	5.00 U1	7.35 U1,J3	5.25 J3	4.675 U1, J3,Y1	6.85 Y1	6.95 U1, J3,Y1	10.20 Y1	7.75 U1, Y1
	Sterling, Ill.	\$74.00 N4						4.775 N4					
WEST	Indianapolis, Ind.								7.00 C5				
	Newport, Ky.											7.75 A9	
	Middletown, Ohio												
	Niles, Warren, Ohio Sharon, Pa.		\$91.50 S1, C10	\$107.00 S1, C10				4.675 S1, R3	6.85 T4	6.95 S1, R3	10.00 S1, R3	7.75 S1	14.55 S1
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	\$74.00 U1	\$91.50 U1, C11	\$107.00 U1, C11	5.90 U1	5.00 U1, J3	7.35 U1, J3	5.00 U1	4.675 P6	5.750 P6 6.85 J3,B4, S7		7.75 S9	14.55 S9
	Portsmouth, Ohio												
	Weirton, Wheeling, Fallonsbee, W. Va.				5.00 W3			4.675 W3	6.85 W3,F3	6.95 W3	9.65 W3		
	Youngstown, Ohio	\$74.00 R3	\$91.50 Y1, C10	\$107.00 Y1			7.35 Y1		4.675 U1, Y1	6.85 Y1,C5	6.95 U1, Y1	10.20 Y1	7.75 U1, Y1
	Pontana, Cal.	\$83.50 K1	\$101.00 K1	\$128.00 K1		5.75 K1	8.10 K1	5.90 K1	5.525 K1	8.70 K1			
	Genova, Utah	\$91.50 C7				5.00 C7	7.35 C7						
	Kansas City, Mo.					5.10 S2	7.45 S2		4.925 S2		7.20 S2		
SOUTH	Los Angeles, Torrance, Cal.		\$101.00 B2	\$127.00 B2		5.70 C7, B2	3.05 B2		5.425 B2, C7	8.90 C1		8.95 B2	
	Minneapolis, Cal.					5.30 C6			5.775 C6				
	Portland, Ore.					5.75 O2							
	San Francisco, Niles, Pittsburg, Cal.		\$101.00 B2			5.65 B2	8.00 B2		5.425 C7,B2				
	Seattle, Wash.		\$105.00 B2			5.75 B2	8.10 B2		5.675 B2				
	Atlanta, Ga.								4.875 A8				
	Fairfield, Ala. City, Birmingham, Ala.	\$74.00 T2	\$91.50 T2			5.30 T2,R3 5.25 C16	7.35 T2		4.675 T2,R3 4.975 C10 4.925 C16	6.95 T2			
	Houston, Lone Star, Texas	\$80.00 L3	\$96.50 S2	\$112.00 S2		5.10 S2	7.45 S2		4.925 S2	7.20 S2			

IRON AGE

STEEL
PRICES(Effective
Feb. 26, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled 18 ga. & byyr.	Cold- rolled	Galvanized	Enamel- ing	Long Terns	Hi Str. Low Alloy H.R.	H Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled 19 ga.	Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Hollowware Enameling 29 ga.
EAST	Bethlehem, Pa.												
	Buffalo, N. Y.	4.675 B3	5.75 B3				6.90 B3	8.525 B3		5.80 W6	† Special coated milg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct \$2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add \$1.00. Differ- ential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conschocken, Pa.	4.725 A2	5.80 A2				6.95 A2						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johstown, Pa.									5.80 B3			
	Fairless, Pa.	4.725 U1	5.80 U1				6.95 U1	8.575 U1			\$9.80 U1	\$8.50 U1	
	New Haven Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	4.675 B3	5.75 B3	6.30 B3			6.90 B3	8.575 B3	9.275 B3	5.90 B3	\$9.80 B3	\$8.50 B3	
MIDDLE WEST	Warcester, Mass.									6.10 A5			
	Trenton, N. J.												
	Alton, Ill.									6.00 L1			
	Ashland, Ky.	4.675 A7		6.30 A7	6.325 A7								
	Canton-Massillon, Dover, Ohio			6.30 R3, R1									
	Chicago, Joliet, Ill.	4.675 W8, A1					6.90 U1			5.80 K2	5.80 A5, R3, N4, W8, K2		
	Sterling, Ill.										5.90 N4, K2		
	Cleveland, Ohio	4.675 J3, R3	5.75 J3, R3		6.325 R3		6.90 R3	8.525 R3, J3		5.80 A5			
	Detroit, Mich.	4.775 G3, M2	5.85 G3, 5.75 M2				7.00 G2	8.625 G3					
	Newport, Ky.	4.675 A9	5.75 A9										
	Gary, Ind. Harbor, Indiana	4.675 U1, I3, Y1	5.75 U1, I3, Y1	6.30 U1, I3	6.325 U1, I3, Y1	6.70 U1	6.90 U1, Y1, I3	8.525 U1, Y1		5.80 Y1	\$9.70 U1, Y1	\$8.40 J3, U1, Y1	7.15 U1, Y1
	Granite City, Ill.	4.875 G2	5.95 G2	6.50 G2	6.525 G2							\$8.50 G2	7.25 G2
	Kokomo, Ind.			6.40 C9						5.90 C9			
	Mansfield, Ohio		5.75 E2			6.70 E2							
	Middletown, Ohio		5.75 A7	6.30 A7	6.325 A7	6.70 A7							
	Niles, Warren, Ohio Sharon, Pa.	4.675 S1, R3, N3	5.75 R3	6.30 R3	6.325 N3	6.70 N3	6.90 S1, R3	8.525 S1, N3				\$8.40 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 U1, J3, P6	5.75 U1, J3, P6	6.30 U1, J3	6.325 U1		6.90 U1, J3, R3	8.525 U1, J3	9.275 U1	5.80 A5, P6, J3	\$9.70 J3, U1	\$8.40 U1, J3	7.15 U1, J3
	Portsmouth, Ohio	4.675 P7	5.75 P7							5.80 P7			
	Weirton, Wheeling, Follenshoe, W. Va.	4.675 W3, W5	5.75 W3, W5, F3	6.30 W3, W5		6.70 W3, W5	6.90 W3	8.525 W3			\$9.70 W5	\$8.40 W5	7.15 W5 7.00 W3
	Youngstown, Ohio	4.675 U1, Y1	5.75 Y1		6.325 Y1		6.90 Y1	8.525 Y1		5.80 Y1			7.15 Y1
WEST	Fontana, Cal.	5.525 K1	7.00 K1				7.75 K1	9.775 K1			\$10.45 K1	\$9.15 K1	
	Geneva, Utah	4.775 C7											
	Kansas City, Mo.									6.05 S2			
	Los Angeles, Torrance, Cal.									6.60 B2			
	Minneapolis, Colo.									6.05 C6			
	San Francisco, Niles, Pittsburg, Cal.	5.375 C7	6.70 C7	7.85 C7						6.45 C7	\$10.45 C7	\$9.15 C7	
	Seattle, Wash.												
	Atlanta, Ga.												
SOUTH	Fairfield, Ala. Alabama City, Ala.	4.675 T2, R3	5.75 T2, R3	6.30 T2, R3						5.80 T2, R3	\$9.80 T2	\$8.50 T2	
	Houston, Tex.									6.05 S2			

IRON AGE

STEEL
PRICES(Effective
Feb. 26, 1957)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

	BARS						PLATES				WIRE
	Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Flame Plates	Alloy	Hi Str. Low Alloy	Mfr's Bright
EAST	Bethlehem, Pa.			6.125 B3	8.325 B3	7.40 B3					
	Buffalo, N. Y.	5.075 B3,R3	5.075 B3,R3	6.90 B5	6.125 B3,R3	8.325 B5,B3	7.40 B3	4.85 B3			7.20 W6
	Claymont, Del.							5.70 C4	6.85 C4	7.55 C4	
	Coatsville, Pa.							5.25 L4	6.85 L4	7.55 L4	
	Conschocken, Pa.							4.95 A2	5.925 A2	6.85 A2	7.25 A2
	Harrisburg, Pa.							5.80 P2	6.275 P2		
	Hartford, Conn.			7.35 R3		8.625 R3	7.40 B3				
	Jehntown, Pa.	5.075 B3	5.075 B3		6.125 B3			4.85 B3	6.85 B3	7.25 B3	7.20 B3
	Fairless, Pa.	5.225 U1	5.225 U1		6.275 U1						
	Newark, N. J.			7.30 W10		8.50 W10					
	Camden, N. J.			7.30 P10		8.50 P10					
	Bridgeport, Conn. Putnam, Conn.	5.30 N8	5.30 N8	7.20 N8 7.40 W10	6.20 N8	8.475 N8	7.50 N8				
MIDDLE WEST	Sparrows Pt., Md.		5.075 B3					4.85 B3	6.85 B3	6.85 B3	7.30 B3
	Palmer, Worcester, Roadville, Mass. Milton, Pa.	5.225 M7	5.225 M7	7.40 B5,C14		8.325 A5 8.625 B5					7.50 A5,W6 8.825 T8
	Spring City, Pa.			7.30 K4		8.50 K4					
	Alton, Ill.	5.275 L1									7.40 L1
	Ashland, Newport, Ky.							4.85 A7,A9	6.85 A9		
	Canton, Massillon, Ohio			6.85 R3,R2	6.125 R3,T5	8.325 R3,R2, T5					
	Chicago, Joliet, Ill.	5.075 U1,R3, W8,N4 5.575 P13	5.075 U1,R3, N4 5.575 P13	6.85 A5,B5, W10,L2 W8,N9	6.125 U1,R3, W8	8.325 A5,B5, W8,L2,N9, W10	5.875 W8	4.85 U1,I3, W8,A1	5.925 U1	6.85 U1,W8	7.25 U1
	Cleveland, Ohio	5.075 R3	5.075 R3	6.85 A5,C13		8.325 A5,C13	7.425 R3	4.95 J3,R3	5.925 J3		7.25 J3,R3
	Detroit, Mich.	5.175 G3	5.425 G3	7.05 B5,P8 7.10 P3 6.85 R3	6.225 G3	8.525 B5,P3, P8 8.325 R3	7.525 G3	4.95 G3		6.90 G3	
	Duluth, Minn.										7.20 A5
	Gary, Ind. Harbor, Crawfordsville	5.075 U1,I3, Y1	5.075 U1,I3, Y1	6.85 R3,M5	6.125 U1,I3, Y1	8.325 R3,M4	7.425 U1,I3, Y1	4.85 U1,I3, Y1	5.925 I3	6.85 U1,Y1	7.25 U1,Y1
	Granite City, Ill.							5.95 C2			
	Kokomo, Ind.										7.30 C9
WEST	Sterling, Ill.	5.175 N4	5.175 N4								7.30 K2
	Niles, Warren, Ohio Sharon, Pa.			6.85 C10	6.125 C10,S1	8.325 C10	7.425 S1	4.85 S1,R3		6.85 S1	7.25 S1,R3
	Pittsburgh, Pa. Midland, Pa.	5.075 U1, C11,J3	5.075 U1,J3	6.85 A5,C9, J3,R3,39, B4,W10,C11	6.125 U1, C11,J3	8.325 A5,R3, S9,C9,W10, C11	7.425 U1,J3	4.85 U1,J3	5.925 U1	6.85 U1,J3	7.25 U1,J3
	Portsmouth, Ohio										7.20 A5,J3, P6
	Watson, Wheeling, Fellansboe, W. Va.							4.85 W3			7.30 P7
	Youngstown, Ohio	5.075 U1, Y1,R3	5.075 U1, Y1,R3	6.85 U1,Y1, F2	6.125 U1,Y1	8.325 Y1,F2	7.425 U1,Y1	4.85 U1,Y1, R3	6.85 Y1	7.25 Y1	7.30 Y1
	Emeryville, Cal.	5.825 J5	5.825 J5								
	Fentana, Cal.	5.775 K1	5.775 K1		7.175 K1		8.125 K1	5.60 K1		7.60 K1	8.00 K1
	Geneva, Utah	5.175 C7						4.85 C7			7.25 C7
	Kansas City, Mo.	5.325 S2	5.325 S2		6.375 S2		7.675 S2				7.45 S2
	Los Angeles, Torrance, Cal.	5.775 C7,B2	5.775 C7,B2	8.30 R3,P14	7.175 B2	10.20 P14	8.125 B2				8.15 B2
	Minneapolis, Colo.	5.525 C6	5.525 C6					5.70 C6			7.45 C6
	Portland, Ore.	5.825 O2	5.825 O2								
SOUTH	San Francisco, Niles, Pittsburg, Cal.	5.775 C7 5.825 B2 6.825 P9	5.775 C7 5.825 B2 6.825 P9				8.175 B2				8.15 C7,C6
	Seattle Wash.	5.825 B2 N6	5.825 B2				8.175 B2	5.75 B2		7.75 B2	8.15 B2
	Atlanta, Ga.	5.575 A8									7.40 A8
	Fairfield, Ala. City, Birmingham, Ala.	5.075 T2,R3 5.325 C16	5.075 T2,R3 5.325 C16	7.45 C16			7.425 T2	4.85 T2,R3			7.25 T2
	Houston, Ft. Worth, Lane Star, Tex.	5.325 S2	5.325 S2		6.375 S2		7.675 S2	4.95 S2 5.20 L3		6.95 S2	7.35 S2

† Merchant Quality—Specialty Quality .35¢ higher.

February 28, 1957

Steel Prices (Effective Feb. 26, 1957)

Key to Steel Producers

With Principal Offices

- A1** Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetal Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Arco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calatip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shifting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperworld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shifting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown

- F3** Follansbee Steel Corp., Follansbee, W. Va.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit
H2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monaca, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit

- P9** Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebeling Sons Co., John A. Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wiconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pt) l.o.b. mills. Base price about \$200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS									
	1/2 In.		3/4 In.		1 In.		1 1/4 In.		1 1/2 In.		2 In.		2 1/2-3 In.		2 In.		2 1/2 In.		3 In.		3 1/2-4 In.			
	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.	Bk.	Gal.
Sparrows Pt. B3	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50										
Youngstown R3	9.25	+10.00	12.25	+6.00	15.75	+1.50	18.25	0.25	18.75	1.25	19.25	1.75	20.75	2.50										
Fontana K1	+3.75	+23.00	0.75	+19.00	2.75	+14 1/2	5.25	+12 1/2	5.75	+11 1/4	6.25	+10.25	7.75	+10.50										
Pittsburgh J3	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50		
Alton, Ill. L1	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50										
Sharon M3	9.25	+10.00	12.25	+2.00	15.75	+1.50	18.25	0.25	18.75	1.25	19.25	1.75	20.75	2.50										
Fairless N2	7.25	+8.00	10.25	+4.00	13.75	0.50	16.25	1.25	16.75	2.25	17.25	2.75	18.75	2.50										
Pittsburgh N1	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50		
Wheeling W5	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25										
Wheatland W4	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25										
Youngstown Y1	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50		
Indiana Harbor Y1	8.25	+9.00	13.25	+2.00	14.75	1.50	17.25	2.25	17.75	3.25	18.25	3.75	19.75	4.25										
Lorain N2	9.25	+6.00	12.25	+2.00	15.75	2.50	18.25	3.25	18.75	4.25	19.25	4.75	20.75	5.25	5.25	+20.25	1.25	+16.50	3.75	+13.00	5.25	+11.50		
EXTRA STRONG PLAIN ENDS																								
Sparrows Pt. B3	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50										
Youngstown R3	13.75	+4.00	17.75	list	20.75	4.50	21.25	4.25	21.75	5.25	22.25	5.75	22.75	5.50										
Fairless N2	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50										
Fontana K1	0.75		4.75		7.75		8.25		8.75		9.25		9.75											
Pittsburgh J3	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50		
Alton, Ill. L1	11.75	+2.00	15.75	2.00	18.75	6.50	19.25	5.25	19.75	6.25	20.25	6.75	20.75	5.50										
Sharon M3	13.75	+4.00	17.75	list	20.75	4.50	21.25	4.25	21.75	5.25	22.25	5.75	22.75	5.50										
Pittsburgh N1	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50		
Wheeling W5	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50										
Wheatland W4	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50										
Youngstown Y1	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50		
Indiana Harbor Y1	12.75	+1.00	16.75	3.00	19.75	7.50	20.25	6.25	20.75	7.25	21.25	7.75	21.75	6.50										
Lorain N2	13.75	+2.00	17.75	4.00	20.75	8.50	21.25	7.25	21.75	8.25	22.25	8.75	22.75	7.50	3.75	+17.75	3.75	+12.00	6.25	+10.50	11.25	+5.50		

Threads only, butt weld and seamless 2 1/4 pt. higher discount. Plain ends, butt weld and seamless, 3-in. and under, 5 1/2 pt. higher discount. Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: 1/2, 3/4 and 1-in., 2 pt.; 1 1/4, 1 1/2 and 2-in., 1 1/2 pt.; 2 1/2 and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2 1/2 and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	\$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.185	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	3	6	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium... .83 D-3, D-5
 Oil hardened manganese .45 O-2
 Special carbon .41 W-1
 Extra carbon .345 W-1
 Regular carbon .29 W-1
 Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

Cladding	Plate (A3, J2, L4)			Sheet (12)	
	10 pct	15 pct	20 pct	20 pct	
302					35.50
304	34.60	38.00	41.50		37.75
316	39.70	43.20	46.65		55.50
321	36.35	39.80	43.50		44.75
347	39.50	43.95	48.45		54.25
405	29.20	33.15	37.05		
410, 430	28.70	32.65	36.55		

CR Strip (S9) Copper, 10 pct, 2 sides, 40.35; 1 side, 33.60.

ELECTRICAL SHEETS

22-Gage	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length)	
		Semi-Processed	Fully Processed
Field	9.00	9.20	
Armature	10.35	10.35	10.85
Elect.	11.00	11.025	11.525
Motor	12.05	12.075	12.575
Dynamo	13.05	13.05	13.55
Trans. 72	14.05	14.05	14.55
Trans. 65	14.60		
Grain Oriented			
Trans. 58	15.10	Trans. 80	18.50
Trans. 52	16.15	Trans. 73	19.00

Producing points: Beech Bottom (W5); Brackenridge (A3); Granite City (G2); Indiana Harbor (I3); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N3); Vandergrift (U); Warren, O. (R3) (20¢ higher, HR); Zanesville, Butler (A7).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

Gross Ton	
Openhearth lump	\$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

HOUSES		Sheets			Strip	Plates	Shapes	Bars			Alloy Bars			
Cities	City Delivery Charge	Hot-Rolled (18 ga. & over)	Cold-Rolled (15 gage)	Galvanized (10 gage/11)	Hot-Rolled		Standard Structural	Hot-Rolled (american)	Hot-Rolled (special quality)	Cold-Finished	Hot-Rolled 4015 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4015 As rolled	Cold-Drawn 4140 Annealed
Atlanta		8.17	9.37	9.83	8.21	8.55	8.59	8.45		10.23				
Baltimore	\$.10	7.79	8.99	9.12	8.27	8.12	8.57	8.34		9.09	14.99	14.44	18.39	18.99
Birmingham	.15	7.98	9.08		8.46	8.36	8.85	8.53		9.23				
Birmingham	.15	7.68	8.88	9.52	7.78	8.01	8.05	8.07	8.44	10.04				
Boston	.10	7.80	9.00		7.82	8.16	8.20			10.12				
Boston	.10	8.94	9.83	11.16	8.89	9.28	9.20	9.17	10.71	15.05	14.59	18.51	18.24	
Buffalo	.15	8.00	9.98		8.99				10.81					
Buffalo	.15	8.00	9.15	10.90	8.20	8.65	8.65	8.40	8.85	8.85	15.00	14.45	18.40	18.10
Chicago	.15	7.80	9.00	9.85	7.82	8.16	8.20	8.07	8.44	8.50	14.65	14.10	18.05	17.75
Cincinnati	.15	8.09	9.20	9.90	7.97	8.31	8.35	8.22	8.59					
Cincinnati	.15	8.09	9.20	9.90	8.29	8.67	8.89	8.53	8.67	8.99	14.93	14.38	18.33	18.03
Cleveland	.15	7.93	9.13	9.75	8.07	8.54	8.72	8.31	8.67	8.75	14.73	14.18	18.13	17.14
Denver		9.55	11.09	12.41	9.70	9.80	9.60	9.75		10.54				17.83
Detroit	.15	8.18	9.40	10.20	8.32	8.66	8.89	8.52	8.86	8.85	15.46	14.36	18.81	18.01
Houston		8.80	9.75		8.85	8.80	9.10	9.00		10.65	15.50		19.30	19.05
Kansas City	.20	8.52	9.72	10.07	8.60	8.83	8.87	8.73		9.42	15.32	14.77	18.72	18.42
Los Angeles	.10	9.00	10.75	11.75	9.20	9.45	9.05	8.90	9.60	11.60	15.85	15.35	19.70	19.45
Los Angeles	.10	9.00	10.90		9.25									
Memphis	.15	8.02	9.22		8.12	8.35	8.39	8.25		9.85				
Milwaukee	.15	8.08	9.28	9.97	8.10	9.75	9.25	8.35	8.71	8.72	14.77	14.22	18.17	17.87
New York	.10	8.55	9.76	10.33	9.00	9.11	9.01	9.11	9.48	10.75	15.02	14.49	18.42	18.14
Norfolk	.20	8.00			8.40	8.35	8.70	8.45		10.70				
Philadelphia	.10	8.25	9.17	10.22	8.68	8.78	8.80	8.81	9.18	9.41	14.80	14.41	18.20	18.06
Philadelphia	.10				10.39	8.92								
Pittsburgh	.15	7.93	9.14	10.20	7.88	8.31	8.35	8.22	8.59	8.75	15.20	14.10	18.55	17.75
Portland		8.90	9.65	11.40	10.25	9.00	9.35	8.95		13.55	16.70	16.10	20.40	20.25
Portland					11.05									
San Francisco	.10	9.05	10.40	10.90	9.05	9.30	9.15	8.90	9.45	12.40	15.85	15.35	19.70	19.45
Seattle		9.35	10.45	11.55	9.50	9.30	9.15	9.30	9.85	13.15	16.55	15.55	19.50	19.20
Seattle		9.55	10.70	11.85			9.35			13.30		15.65		
Spokane	.15	9.50	10.60	11.60	9.70	9.20	9.30	9.50	10.00	13.30		16.55		20.10
Spokane	.15	9.70	10.85		9.45		9.50							
St. Louis	.15	8.54	9.74	10.21	8.34	8.67	8.82	8.58	8.96	9.08	14.83	14.43	18.23	18.08
St. Paul	.15	8.29	9.64	10.31	8.39	8.71	8.75	8.52		9.11	14.98	14.46	18.38	18.11
St. Paul	.15				8.58	9.05	9.08			9.21		14.62		18.27

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

† 16 gage. †† 13 1/2¢ zinc. ‡ Deduct for country delivery.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Cented Nails		Woven Wire Fence		1/2" Fence Posts		Galv. Barbed and Twisted Barbed Wire		Merch. Wire Ann'd		Merch. Wire Galv.	
	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal	Cal
Alabama City R3	167	181			195		187	8.10		8.50		
Albuquerque, Pa. J3**	164	179					181	7.95		8.475		
Atlanta A8**	166	182			192		190	8.05		8.65		
Bartonsville K2**	166	182			192		190	8.05		8.65		
Buffalo W6								8.10		8.50		
Chicago, Ill. N4**	164	180	167	190			188	7.95		8.55		
Cleveland A6	173							8.10				
Cleveland A5								7.95				
Crawfordsville M6**	166	182			192		190	8.05		8.65		
Danora, Pa. A5	164	176			190		184	7.95		8.35		
Duluth A5	164	176			190		184	7.95		8.35		
Fairfield, Ala. T2	164	176			190		184	7.95		8.35		
Galveston D4	180											
Houston S2	169	181			195		189	8.20		8.60		
Johantown, Pa. B3**	164	180	167				188	7.95		8.55		
Joliet, Ill. A5	164	176			190		184	7.95		8.35		
Kokomo, Ind. C9	166	178			192		186	8.05		8.45		
Kansas City S2*	169	181			195		189	8.20		8.60		
Minneapolis C6	169	181	172	195			189	8.20		8.60		
Minneapolis F6	167	185					191	8.10		8.10		
Pittsburg, Cal. C7	186	199					204	8.90		9.30		
Portsmouth P1								7.95				
Rankin, Pa. A5	164	176					184	7.95		8.35		
Se. Chicago R3	167	181			195		187	8.10		8.50		
S. San Francisco C6					214			8.90		9.30		
Sparks, Pa. B3**	166				192		190	8.05		8.65		
Strother, O. Y1*								7.95		8.45		
Warren, Pa. A5	170							8.25		8.65		
Williamsport, Pa. S5		175										

* Zinc less than .10¢. † Plus zinc extras.
 ** 13.5 zinc. ‡ Wholesalers only.
 *** .10¢ zinc.

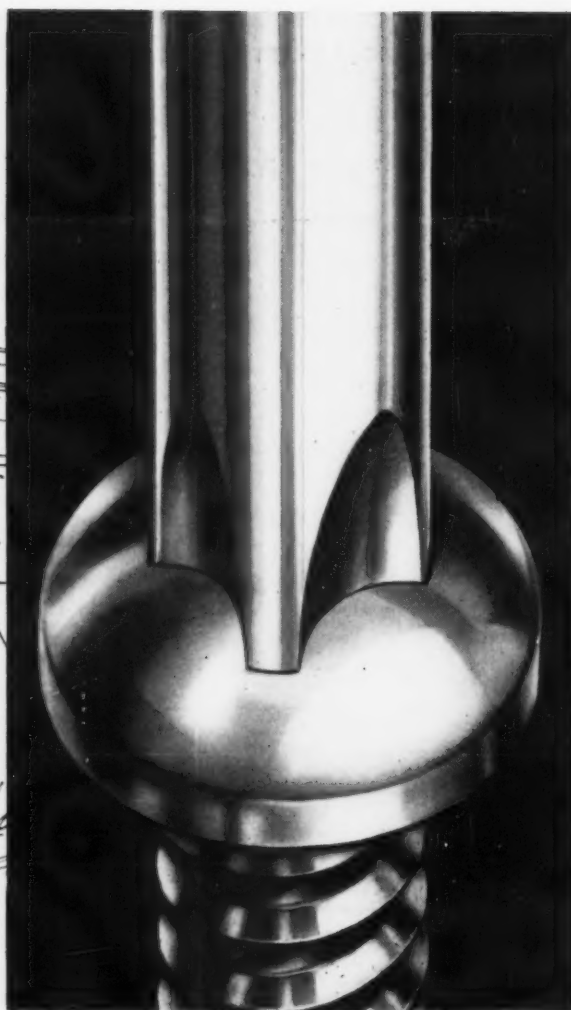
C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT					
	0.26	0.40	0.60	0.80	1.05	1.35
Baltimore, Md. T8	9.20	10.40	12.60	15.60	18.55	
Bristol, Conn. W12		10.40	12.60	15.60	18.55	
Boston T8	9.20	10.40	12.60	15.60	18.55	
Buffalo, N. Y. R7	7.95	9.80	12.60	15.00	17.95	
Carnegie, Pa. S9	8.65	10.10	12.30	15.30		
Cleveland A5	8.65	10.10	12.30	15.30	18.25	
Detroit D1	8.75	10.20	12.40	15.40		
Detroit D2	8.75	10.20	12.40			
Dover, O. G4	7.95	9.80	12.00	15.00	17.95	
Franklin Park, Ill. T8	8.75	10.10	12.30	15.30	18.25	
Harrison, N. J. C11		12.30	15.30	18.25		
Indianapolis C5	8.10	9.95	12.60	15.60	17.95	
Los Angeles	10.85	12.30	14.50			
New Castle, Pa. B4	7.95	9.80	12.60	15.00		
New Haven, Conn. D1	9.10	10.40	12.60	15.60		
Pawtucket, R. I. N7	9.20	10.40	12.60	15.60	18.55	
Pittsburgh S7	7.95	9.80	12.60	15.00	17.9	
Riverdale, Ill. A1	8.75	10.10	12.30	15.30	18.25	
Sharon, Pa. S1	8.65	10.10	12.30	15.30	18.25	
Trenton R4	11.05	10.40	12.60	15.60	18.55	
Wallingford W1	9.10	10.40	12.60	15.60	18.45	
Warren, Ohio T4	7.95	9.80	12.60	15.00	17.95	
Weirton, W. Va. W3	7.95	9.80	12.60	15.00	17.95	
Worcester, Mass. A5	9.20	10.40	12.60	15.60	18.55	
Youngstown C5	7.95	9.80	12.60	15.00	17.95	

† On application.

BOILER TUBES

\$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size		Seamless		Elec. Weld	
	OD- In.	B.W. Ga.	H.R.	C.D.	H.R.	C.D.
Babcock & Wilcox	2	13	36.34	42.56	33.21	
	2 1/2	12	48.94	57.31	44.73	
	3	12	56.51	66.18	51.64	
	3 1/2	11	65.97	77.25	60.30	
	4	10	87.61	102.59	80.07	
National Tube	2	13	36.34	42.56	33.21	
	2 1/2	12	48.94	57.31	44.73	
	3	12	56.51	66.18	51.64	
	3 1/2	11	65.97	77.25	60.30	
	4	10	87.61	102.59	80.07	
Pittsburgh Steel	2	13	36.34	42.56		
	2 1/2	12	48.94	57.31		
	3	12	56.51	66.18		
	3 1/2	11	65.97	77.25		
	4	10	87.61	102.59		



They may seem the same but...
AMERICAN is the name!

Your actual fastening costs are determined by four factors:

1. Price 2. Service 3. Quality 4. Research

In some instances, local price differentials may seem worthwhile, but no one gives you more of all four than American.

American Gives You More of All Four

In Service — where American is continually proving its ability to meet any reasonable delivery requirement regardless of geographical location.

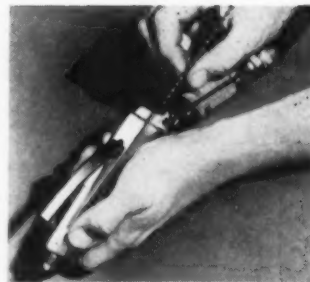
In Quality — where production tools made to precision specifications far exceed standard requirements.

In Research — where American engineers have not only developed the universally accepted Phillips Head Fastener but have produced such

exclusive products as SCREWSTICK for industries with unique fastening problems. SCREWSTICK replaces the tedious handling of individual screws with automatic power driving, resulting in cost savings exceeding 4 to 1.

You can utilize these same facilities to speed production, increase quality and lower costs, because no one gives you more of all four factors; *price, service, quality and research* than American.

Decide for yourself. Send us your inquiry for price and delivery or your specifications for special fasteners. Write:



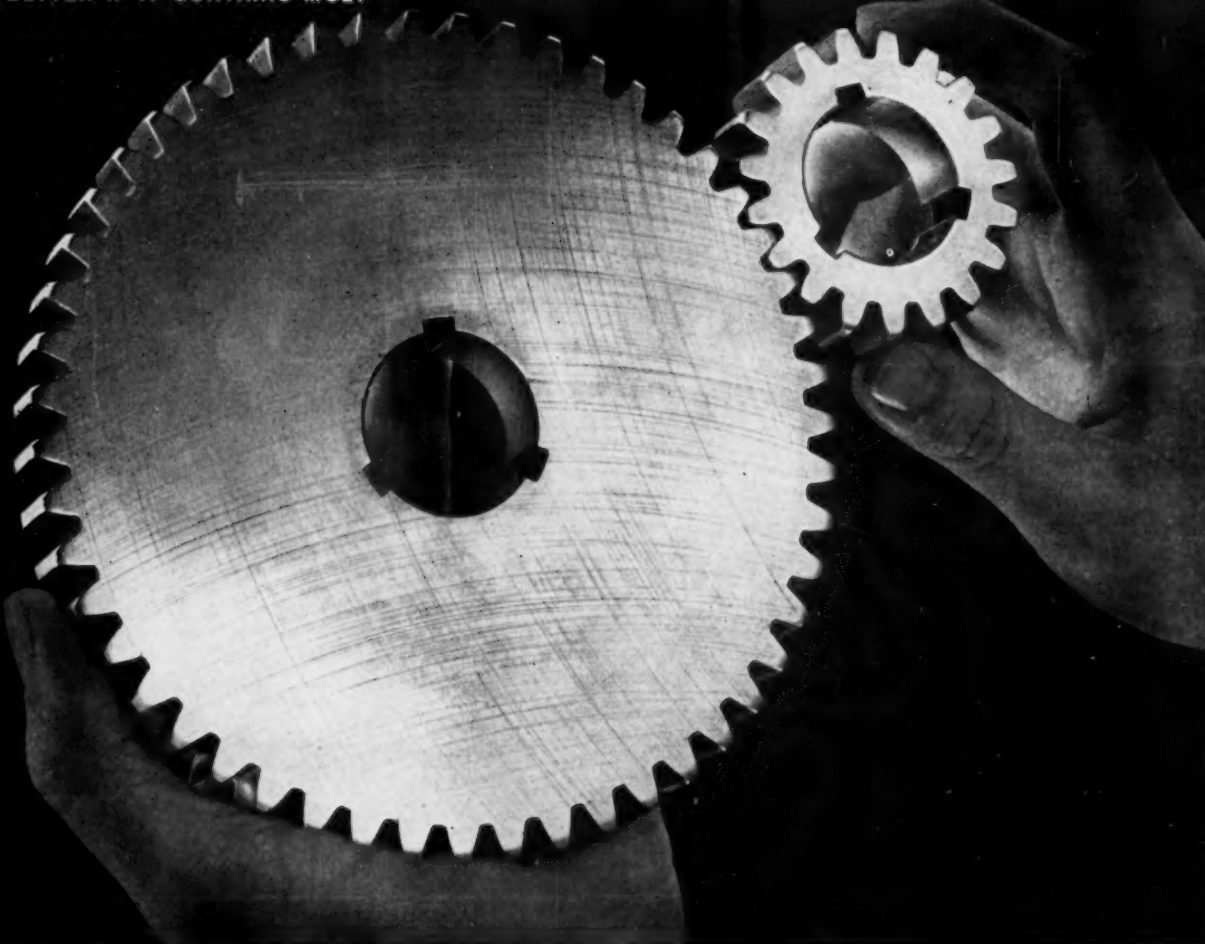
SCREWSTICK being loaded into air-powered driver

AMERICAN SCREW COMPANY
 Willimantic, Connecticut
 Norristown, Pa. • Chicago, Ill.
 Detroit, Michigan



American!

IT'S BETTER IF IT CONTAINS MOLY



Up to 1% Moly in carburizing steels gives required hardenability economically

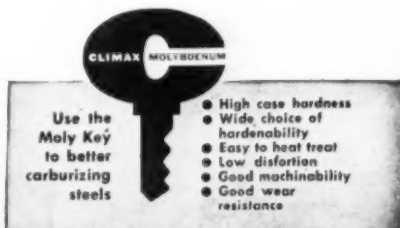
Why limit the use of molybdenum to the .15/.25% Mo and .20/.30% Mo contents of the traditional grades? For the contributions of moly do not stop there. Laboratory tests and production runs prove that as molybdenum contents increase up to 1%, hardness increases progressively. A wide range of case and core hardenabilities, therefore, can be obtained — economically, too.

Tests with a series of molybdenum-manganese steels show that these compositions give higher case hardness on a direct quench than other steels of comparable core hardenability. One extensively tested composition, for example, is 0.5% Mo — 0.5% Mn steel. It shows longer

life, and is lower in cost than steels previously used. And it produces a higher case hardness with similar or less distortion. What's more, tool life and surface finish are equal or better. Good reasons why several companies have already adopted this grade for automotive gears and other critical applications.

If you use carburizing steels, see what a higher molybdenum content can do for you. Part of the story is contained in the technical article "New Carburizing Steels For Critical Gearing." For your copy, or other technical data, write Climax Molybdenum Co., Dept. 2, 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM



RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Rails Untreated
Bessemer <i>U1</i>	5.075	6.00	6.35				
St. Chicago <i>R3</i>				8.775			
Ensley <i>T2</i>	5.075	6.00					
Fairfield <i>T2</i>		6.00		8.775		6.025	
Gary <i>U1</i>	5.075	6.00				6.025	
Huntington <i>C6</i>		6.00					
Ind. Harbor <i>J3</i>	5.075		6.35	8.775		6.025	
Ind. Harbor <i>V1</i>				8.775			
Johnstown <i>B3</i>		6.25					
Juliet <i>U1</i>	5.075		6.35				
Kansas City <i>S2</i>				8.775			
Lackawanna <i>B3</i>	5.275	6.25	6.60			6.275	
Lehanon <i>B3</i>							13.85
Minnequa <i>C6</i>	5.075	6.50	6.35	8.775		6.025	13.10
Pittsburgh <i>P5</i>				8.775	12.85		
Pittsburgh <i>J3</i>				8.775			13.10
Seattle <i>B2</i>				9.275		6.175	13.10
Steelton <i>B3</i>	5.275		6.60			6.275	13.85
Struthers <i>V1</i>				8.775			
Torrance <i>C7</i>							
Williamspart <i>S5</i>		6.15					
Youngtown <i>R3</i>				8.775			

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsville, Pa.	\$15.00 to \$15.75
Foundry, beehive (f.o.b. oven)	
	\$17.50 to \$19.00

Buffalo, del'd	\$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	30.00
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.65
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.50
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	30.50
Lone Star, f.o.b.	25.50
Neville, Is., Pa.	29.25

Cents per lb f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	24.75	40	160, 110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	35.25			
2 1/2	30	37.25			
2	24	57.75			

ELECTROPLATING SUPPLIES

(Cents per lb, fwt allowed in quantity)

Copper	
Cast elliptical, 18 in. or longer, 5000 lb lots	53.42
Electrodeposited	48.25
Brass, 80-20, ball anodes 2000 lb or more	54.00
Zinc, ball anodes, 2000 lb lots	21.25
(for elliptical add 2¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	\$1.0225
(rolled depolarized add 3¢ per lb)	
Cadmium	\$1.70
Tin, ball anodes and elliptical \$1.07 per in.	
Chemicals	
(Cents per lb, f.o.b. shipping point)	
Copper cyanide, 100 lb drums	77.50
Copper sulphate, 100 lb bags, per cwt.	26.65
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 200 lb	45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.05
Philadelphia price (23.30)	
Zinc cyanide, 300 lb	55.55
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 1 to 20 100-429 lb drums	31.75

(Base discount, f.o.b. mill)
Pct Discounts

Machine and Carriage Bolts	Full Container Price	30 Containers	20,000 Lb.	40,000 Lb.
$\frac{1}{2}$ " and smaller x 6" and shorter	55	58 $\frac{1}{2}$	60 $\frac{1}{2}$	61 $\frac{1}{2}$
$\frac{1}{4}$ " thru $\frac{1}{2}$ " x longer than 6"	40 $\frac{1}{2}$	50	52 $\frac{1}{2}$	54
Roll threaded carriage bolts $\frac{1}{2}$ in. & smaller x 6 in. and shorter	55	58 $\frac{1}{2}$	60 $\frac{1}{2}$	61 $\frac{1}{2}$
Lag, all diam. x 6" & shorter	55	58	60	61
Lag, all diam. longer than 6"	47	50	52	53
Plow bolts, $\frac{1}{2}$ " and smaller x 6" and shorter	54	57 $\frac{1}{2}$	59	60

Nuts, Hex, HP reg. & hvy.	Full Case or Keg Price
$\frac{3}{4}$ in. or smaller	63
$\frac{7}{8}$ in. to 1 in. inclusive	59½
1¼ in. to 1½ in. inclusive	64
1½ in. and larger	58

3/4 in. and smaller.....	63
7/8 in. to 1 1/2 in. inclusive	59 1/2
1 5/8 in. and larger	58

3/4 in. and smaller	50
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¾ in. or smaller	63
7/8 in. to 1½ in. inclusive	59½
1 5/8 in. and larger	58
(Add 25 pct for broken case or keg quantities)	

1 in. and smaller	65
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	Base per 100 Lbs
1/2 in. and larger	\$10.8
	Pct Off Lbs
7/16 in. and smaller	26 1/2

Discount (Packages
Bright Treated H. C. Hea

New std. hex head, pack- aged		
5/8" diam. and smaller x 6" and shorter	47	34
3/4", 7/8" and 1" diam. x 6" and shorter	31	13
5/8" diam. and smaller x longer than 6"	18 1/2	+ 1
3/4", 7/8" and 1" diam. & longer than 6"	5 1/2	+ 19 1/2
C-1018 Steel Full-Finished Cartons Bulk		

$\frac{1}{4}$ " through $\frac{5}{8}$ " dia. x 6"		
and shorter	47	63
$\frac{3}{8}$ " through 1" dia. x 6"		

Minimum quantity— $\frac{1}{4}$ " through $\frac{3}{8}$ " diam., 15,000 pieces; $\frac{1}{16}$ " through $\frac{1}{4}$ " diam., 5,000 pieces; $\frac{3}{4}$ " through 1" diam. 2,000 pieces.

Plain Finish	Discount Mach. Stove Screws Bolts
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Cartons		19	32
Bulk	<i>Quantity</i>		
To 1/4" diam. incl.	} 25,000-200,000	9	54
5/16 to 1/2" diam. incl.			
All diam. over 3/4" long	} 5,000-100,000	—	54

	Discount
	Hex Squa
In cartons	16 19

	Quantity		
In Bulk			
3/8" diam. & smaller	15,000-100,000	7	9

Birmingham	119.0
New York	131.7
Chicago	134.1
San Francisco-L. A.	140.2

Dec. 1955 value, Class B or heavier
 6 in. or larger, bell and spigot pipe. Ex-
 planation: p. 57, Sept. 1, 1955, issue.
 Source: U. S. Pipe and Foundry Co.

Fire Clay Brick

	Carloads per 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add \$5.00)	\$128.00
No. 1 Ohio	128.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add \$2.00)	20.00

Mt. Union, Pa., Ensley, Ala. \$140.00

Childs, Hays, Pa.	145.00
Chicago District	150.00
Western Utah	144.00-165.00
California	170.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	150.00-157.00
Silica cement, net ton, bulk, Latrobe	26.50
Silica cement, net ton, bulk, Chicago	24.00
Silica cement, net ton, bulk, Emery Ala.	25.50
Silica cement, net ton, bulk, Mt. Union	23.00
Silica cement, net ton, bulk, Utah and Calif.	35.00

Standard chemically bonded, Balt. \$98.00

Standards chemically bonded, Curt-	
iner, Calif.	108.00
Burned, Balt.	92.00

Standard, Baltimore	\$121.00
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Chemically bonded, Baltimore	109.00
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Grain Magnesite St. $\frac{3}{8}$ to $\frac{1}{4}$ -in. grains

Domestic, f.o.b. Baltimore in bulk, \$69.40	
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	43.00
in sacks	49.00

Dead Burned Dolomite Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	\$16.00
Midwest	16.38
Missouri Valley	15.00

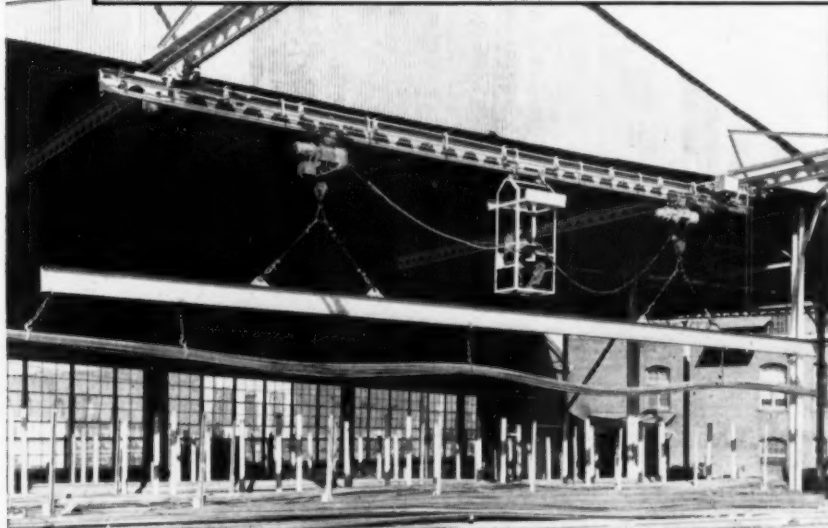
Per pound, f.o.b. shipping point, in lots

lots, for minus 100 mesh	
Swedish sponge iron f.o.b.	
Riverton, N. J., ocean bags	8.50¢
Canadian sponge iron,	
Del'd in East, carloads	9.50¢
Domestic sponge iron, 98 + %	
Fe, carload lots	8.50¢
Electrolytic iron, annealed,	
Imported 98 + % Fe	27.50¢
domestic 99.5 + % Fe	36.50¢
Electrolytic iron, unannealed	
minus 325 mesh, 99 + % Fe	57.00¢
Electrolytic iron melting	
stock, 99.84% pure	22.00¢
Carbonyl iron size 5 to 10	
micron, 98%, 99.8 + % Fe.	86.0¢ to \$1.50
Aluminum, freight allowed.	38.00¢
Brass, 10 to tons	37.50¢ to 50.00¢
Copper, electrolytic	48.75¢
Copper, reduction	49.75¢
Cadmium, 100-199 lb, 95% plus metal value	
Chromium, electrolytic 99.85%	
min. Fe .03 max. Del'd	\$5.00
Lead	8.90¢ plus metal value
Manganese	70.00¢
Molybdenum, 99%	\$3.60 to \$3.90
Nickel, unannealed	\$1.00
Nickel, annealed	\$1.00
Nickel, spherical, unannealed	\$1.10
Silicon	43.50¢
Solder powder - 7.0¢ to 9.0¢ plus met. value	
Stainless steel, 302	99.00¢
Stainless steel, 316	\$1.30
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	\$4.20
Zinc, 10 ton lots	18.75¢ to 32.50¢



Unloading bundles of rod with a Cleveland Tramrail transfer crane arranged for push-button floor control. This crane may be interlocked with the track system serving various sections of the shop, enabling the load being delivered directly to point of use with the Tramrail hoist carrier without need of any in-between handling.

Rod Forming Plant Cuts Production Time **50%** | Reduces Costs Tremendously with Cleveland Tramrail System



Here the same crane is shown with an operator's cab and second hoist carrier. The hoists support a lifting beam which will handle bundles of rod up to 60'-0" long. Note the runway extensions that permit spotting the crane directly over a gondola car.

THERE is no comparison between a shop equipped with Cleveland Tramrail handling equipment and one using hand methods," said an executive of the Southern GF Co., Atlanta, Georgia.

He should know, because this prominent company has cut production costs in half in the cutting and forming of steel rod for concrete work. Savings are made with the tramrail starting with unloading of incoming steel and through the various steps of manufacture. For instance, only 10 man-hours are now required to unload a railroad car as compared to 45 formerly required.

The Cleveland Tramrail at Southern GF has been designed to provide the utmost in flexibility of handling. It consists of transfer cranes and

a track and switch system. The crane used for car unloading can be arranged for floor control or cab control. The latter arrangement is used when 60-foot long bundles of rod are handled by two widely spaced hoists, the cab being located at the center of the bridge.

*Write for free Engineering and Application Booklet
No. 2008. Packed with valuable information.*



Ferroalloy Prices

(Effective Feb. 26, 1957)

Ferrochrome

Contract prices, cents per lb contained		
Cr, lump, bulk, carloads, del'd	67-71% Cr, 30-1.00% max. Si	
0.02% C	41.50	0.20% C ... 38.50
0.03% C	41.00	0.50% C ... 38.25
0.06% C	39.50	1.00% C ... 37.50
0.10% C	39.00	1.50% C ... 37.35
0.15% C	38.75	2.00% C ... 37.25
4.00-4.50% C	67.70% Cr, 1-2% Si	27.75
3.50-5.00% C	67.64% Cr, 2.00-4.50% Si	27.75
0.025% C (Simplex)		34.75
0.10% C	50-52% Cr, 2% max Si	35.75
8.50% max. C	50-55% Cr, 3-6% Si	24.00
8.50% C	50-55% Cr, 3% max Si	24.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.	
0.10% max. C	\$1.31
0.50% max. C	1.31
9 to 11% C, 33-91% Cr, 0.75% Fe	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (1/4" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.	
Carloads	\$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.)	
Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.	
Carloads	44.65
Ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.	
30-33% Cr, 60-65% Si, 3.00 max. Fe.	
Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese-Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.	
16-20% Ca, 14-18% Mn, 53-59% Si.	
Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe 1/4 in. x 12 mesh.	
Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 33-42% Cr, 17-19% Si, 8-11% Mn, packed.	
Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.	
Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.	
Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	12.75
Johnstown, Pa.	12.75
Sheridan, Pa.	12.75
Philo, Ohio	12.75
S. Duquesne	12.75
Add or subtract 0.1¢ for each 1 pct Mn above or below base content.	
Briquets, delivered, 66 pct Mn:	
Carloads, bulk	14.80
Ton lots packed	17.20

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.	
Manganese Silicon	
16 to 19% 3% max.	\$100.50
19 to 21% 3% max.	102.50
21 to 23% 3% max.	105.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.	
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.	
Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.	
Carloads	33.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for Hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn	
	25.50

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.			
	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.40
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80.85% Mn, 5.0-7.0% Si	28.60	31.40	32.60

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.	
Carloads bulk	13.80
Ton lots	15.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	15.10
Ton lots, packed	17.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., \$100.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., \$93.00.	
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Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.		
	Ton lots	Carloads
96.50% Si, 2% Fe	23.95	22.65
98% Si, 0.75% Fe	24.45	23.15

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.	
Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Contract prices, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.			
50% Si	13.90	75% Si	16.80
65% Si	15.65	85% Si	18.50
90% Si	19.90		

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.	
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	Cast	Turnings	Distilled
Ton lots	\$2.05	\$2.95	\$3.75
Less ton lots	2.40	3.30	4.55

Ferrovandium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.	
Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Alsifer, 20% Al, 40% Si, 40% Fe.

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.	
Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound Contained Mo

	\$1.28
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Ferrocolumbium, 50-50%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	\$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd ton lots, 2-in. x D per lb cont't Sb plus Ta.

	\$4.95
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Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.

	\$1.68
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Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., \$4.00 unitage, per gross ton.

10 tons to less carload	\$90.00
	\$110.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb. contained Ti.

	\$1.35
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Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti.

	\$1.50
Less ton lots	\$1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton.

	\$215.00
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Ferrotungsten, 1/4 x down, packed, per pounds contained W, ton lots delivered.

	\$3.15
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Molybdenic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa.

bags, f.o.b. Washington, Pa., Langeloth, Pa.	\$1.41
	\$1.33

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V₂O₅ contract, basis, per pound contained V₂O₅

	\$1.38
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Zirconium contract basis, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borasil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload	\$5.50
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Bortam, f.o.b. Niagara Falls, Ton lots per pound.

Less ton lots, per pound	45¢
	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed.

Ton lots per pound	14.00¢
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Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots.

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up	
10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight, allowed, 100 lb and over

No. 1	\$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	\$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots.

	\$2.15
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Inland Ledloy*..the original leaded steels

Nearly twenty years ago, Inland started a metalworking revolution with its discovery of how to add lead to steel. The first experimental heat and the first production heat of leaded steels were made in Inland furnaces. Since then, by unending probing, refining, and perfecting, Inland has learned the secrets of making fine leaded steels. Today, Inland, the largest producer of leaded steels, sets the standards with which all other free machining steels are compared.



The precise gunning of 30 pounds of tiny lead pellets into 10,000 pounds of molten steel is the most critical step in the production of leaded steels. The combined experience of the crew assigned to this exacting operation is one of the key reasons for the consistently high quality of Inland Ledloy steels.

The addition of lead does amazing things to the machin-

ability of steel without affecting any of its desirable mechanical properties. A switch to Ledloy that results in a 50% increase in production rate is not uncommon, and, in some automatic screw machine operations, Ledloy has replaced brass. Inland's twenty years of experience with leaded steels helps make Ledloy steels the world's most machinable.

Experience makes Inland Ledloy better

INLAND LEDLOY is sold in cold drawn form, under various trade names, by leading cold drawers and steel warehouses from coast to coast.

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D100-12"

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or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Temporary Virus? . . . Like a man with a cold, the New York used machinery market isn't seriously ill, but it's not in the best of condition. Fortunately, nobody expects the market sickness to flare up into something more serious later. Dealers agree that spring will bring back the bloom of health.

It's difficult to pinpoint the market easing. There are no real soft spots, just an overall dulling. Inquiries continue at a good clip, but sales have lost the high luster of earlier months, at least for the time being. One leading dealer describes customer attitude as "A sort of hesitation" about buying.

Supplywise, the market is virtually unchanged. Any softening in tight lines such as ironworkers, some types of grinders and presses, cranes and toolroom equipment is barely perceptible. Hence the idea of shopping by price-conscious customers is discounted.

Reasons Why . . . Two major reasons are given as prime causes of buyer hesitation. First is the seasonal drop in construction activity. Actually, the demand for machinery in this field held up longer than building, as contractors searched out hard-to-get equipment against resumption of work this spring.

Some pessimistic forecasts of 1957 construction volume—right or wrong—have undoubtedly been discouragers for some. But machinery dealers are confident that warmer weather will reheat this market. They point out that the biggest real hindrance to higher volume in construction equipment is shortage of machinery to sell.

Root of All Evil . . . Second frequently named depressant is money. The green stuff is hard to find these days, with banks holding on to what they have. When you find it, it's expensive, and currently much in demand for taxes,

higher material and labor costs. Dealers point out that many inquiries come from companies who are obviously making up budgets, allotting money for future purchases. In addition, the sales easing is undoubtedly a reflection of the cautious buying practices which have already shown up in other areas. Companies trimming steel inventories, for example, are not likely to be extravagant in ordering extra tools.

Hopes High . . . Tight money, stock market dips and recent hair-curling talk of depressions probably are important factors in this go-slow psychology. But dealers are not worried. They stress that business is still good, even though not up to the levels of the months just past. The current high volume of inquiries they see as an indication of future sales. And they repeat that the biggest problem is still lack of tools to sell.

Amber Light? . . . The go-slow philosophy is also evident in the attitude of Philadelphia dealers toward auctions. While they concede that business is pretty good, they're not too eager to buy at auctions, especially those held at out of the area locations. Reason is the high prices bid for equipment. Some used machines are being sold at prices approaching those of new tools. And high prices for used equipment are not confined to the East.

At Chicago it's reported that used tool prices, particularly for cranes and specialized units, have shown no drop. While there was word of some cutback in West Coast buying out of the Midwest and slowdowns in markets to the south of Chicago, it's hard to prove. There's still a strong movement of tools to both areas and a strong rate of incoming inquiries for more equipment. Supplies of equipment are in short supply. Dealers are searching distant areas for tools to resell.

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10 ton P&H 38' Span 230 Volt D.C.
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15 ton P&H 48' Span 230 Volt D.C.
15 ton Shupard Niles 51' Span 230 Volt D.C.
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With 10 ton Auxiliary

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SHEARS—BAR

No. 12 Buffalo Armor Plate

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62" x 1 1/2" Peck Stow & Wilcox

8" x 1/4" Niagara—NEW 1952

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1	1500	G.E.	MT	6600	257
1	1100	F.M.	OVZK, B.B.	4800	1800
1	1000	A.C.	Mill	2300	240
1	800	G.E.	MT	2500	293
1	750	G.E.	MT-573	2200	1190
1	700	A.C.		2300	500
1	500	Whae.	CW	550	350
1	480	Whae.	CW	440	514
1	350	G.E.	IM-17A	440/2200	720
1	250	G.E.	MT-424Y	4000	257
1	250	Cr. Wh.	8120	2300	350
1	250	Al. Ch.		550	600
1	200	G.E.	IE13 B-M	220/440	1760
1	200	G.E.	MT-557Y	230/440	1760
1	200	Cr. Wh.	28QB	440	505
1	200	G.E.	IM	440	435
1	200	G.E.	IM	590	500
1	150 (unused)	Whae.	CW	2300	435
1	125	A.C.		440	865
1	125	Al. Ch.		440	720
1	100	G.E.	IM-18	440	865
1	100	G.E.	IM	440	800
1	100	A.C.	ANY	440	895

SQUIRREL CAGE

1	800	G.E.	KT-573	3200	1180
1	850	G.E.	PT-559BY	440	3570
3	450	Whae.	CS-1420	2300/4150	354
1	400	G.E.	IK	2200	500
1	300	G.E.	KT-559A	2300	1775
1	200	G.E.	IK-17	440	580
3	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	440/900/450	
1	150	Whae.	CS8568	440	880
1	150	Whae.	CS	440	580

SYNCHRONOUS

Qu.	H.P.	Make	Types	Volts	RPM
1	7000	G.E.	ATI	2200/6000	600
1	4350	C.W.	35018L4000/6000/13800	514	
1	2850	Whae.	.8p.f.	2300/4600	514
1	2800	Whae.	.8p.f.	2300	720
2	2000	Whae.		2300	120
2	1750	G.E.	ATI	2200	3600
1	735	G.E.	ATI	2200/12000	600
1	450	Whae.		2200	128.5
1	375	G.E.	ATI	440	1800
1	225	G.E.	ATI	440	1800
1	100	G.E.	TS-7556	230/440	900

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Constant Duty—3 phase, 60 cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1000	Whae.	CW	2300	440
1	700	Whae.	CW	2300	300
2	500	Al. Ch.	ARY	2300	505
1	500	G.E.	I-M	2300	450
1	400	Al. Ch.	ARY	2200	505
1	400	Whae.	CW	2200	290
1	350	G.E.	MT-412	2200	450
2	300	Whae.	CW	2300	1200
1	250	Whae.	CW	2200	720
1	250	Al. Ch.	ARY	440	705
1	250	G.E.	CW-1106	2200	435
1	250	G.E.	MT-414	2200	300
1	200	G.E.	I-M	2200	1760
2	200	G.E.	I-17-M	2200	585
1	200	G.E.	I-14-M	2200	490
1	150	Al. Ch.	ARY	440/230	720
1	150	Whae.	CW	4160/2300	585
1	150	Whae.	CS-1000	440	435
1	100	Whae.	CW	440/220	1160
1	100	El. Dy.	EDX612	2300	900
2	100	G.E.	MT-562	440/220	570
2	100	G.E.	I-15A-M	2300	495
1	100	Al. Ch.	ARY	440	430

SYNCHRONOUS MOTORS

3 Phase, 60 Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	2000	Whae.	90	2200	180
1	1750	G.E.	100	2200	3600
1	1500	Whae.	80	2300	514
1	920	G.E.	80	2200/440	300
1	710	G.E.	80	2300	720
1	450	Whae.	100	2200	128.5
3	350	G.E.	100	2300	900
1	300	G.E.	100	2300	720
1	300	G.E.	80	2200	600
2	300	G.E.	80	440	400
2	250	Whae.	80	440	600
1	200	Al. Ch.	100	2200	514
1	200	Al. Ch.	100	2300	360
1	150	G.E.	100	2200	900
1	150	El. Mchry	80	220	720
1	150	G.E.	100	550	600
3	135	G.E.	80	4600/2200	1200
1	125	G.E.	80	2200	900
2	100	Whae.	80	440/220	1800
1	100	Ideal	80	440/220	900
2	100	G.E.	80	440/220	600
1	100	El. Mchry	160	440/220	360
2	50	G.E.	80	2200	600

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No. 74 Heald hyd. pl. internal, X-sliding H. S., 1941.
16" x 36" Landis type C hyd. pl. cylindrical, 1942.

HAMMERS

No. 3C Chambersburg pneumatic, serial No. 2297.
No. 6-1 Nazel, pneumatic, late.
No. 6B Nazel, self-contained.

LATHES

No. 3 Gisholt Univ. Turret Lathe (2), 1942.
No. 5 Gisholt ram type Univ. Turret Lathe, 1940.
15" x 30" Lips Carb-Matic, 1942.
126" x 90" CC Niles Cement Pond engine lathe, 80
HP, M.D.

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No. 5-48 Cincinnati hydromatic duplex mill, serial
3B5D1K-5.
No. 2-24 Cincinnati automatic simplex mill, serial
No. 1B3P1T-1.

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350 ton Elmes self-cont. 4-post Hydraulic Press, 1944.
500 ton No. 1039 Hamilton D.C. adj. bed, 80"x102",
800 ton Model 2E-48-800 Hamilton, S.S. air clutch,
new 1947.
2000 ton No. 6 National Maxipress Forging Press.

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36 Rockford hyd. vertical slotter, new 1944.

UPSETTERS

1 1/2" National Upsetter, guided ram, hard ways.
3" Ajax upsetting & forging machine, air clutch,
serial 3614.
3" National high duty forging machine, serial 14185.
3 1/2" Ajax suspended slides, steel frame.
4" National high duty, susp. & guided rams.
7 1/2" National Upsetter, air clutch, new 1944.

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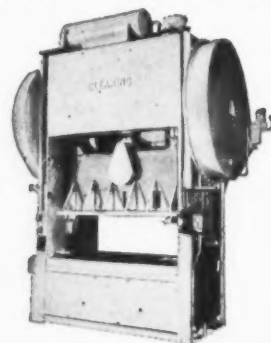
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METALWORKING BRIEFS

Armco Optimistic; Ploughs Back \$50 Million

Despite dire short term predictions by some steel market analysts, Armco Steel Co. announced a \$50 million expansion program for its Ashland, Ky., and Houston, Tex., mills. The additions totaling 750,000 tons will bring Armco's capacity to seven million tons by mid-1959, R. L. Gray, Armco president, said.

Chevrolet Output Down 21.5 pct.

Unbalanced inventories in some sections of the country were responsible for a 21.5 pct cutback in Chevrolet auto production last week, the company reports. Chevrolet laid off an undisclosed number of workers and put four of its 12 assembly plants on a short work-week. Slow sales due to bad weather in the Northeast were partially to blame.

Purchasing Agents Resisting High Prices

Resistance to high prices is the rule among purchasing agents today, according to the National Assn. of Purchasing Agents. Most are buying only enough to meet current production levels. A poll shows that they think most materials will be in plentiful supply this year.

Phoenix Modernizes Plate Mill

Phoenix Iron & Steel Co., Harrisburg, Pa., has completed conversion of its 126-in. plate mill from steam to electric drive. This and other improvements, including a new run-out table and slab-handling facilities, permit the mill to process plate up to 12,500 lb, double the weight previously handled.

GM Profits Drop

General Motors profits for 1956 dropped 28 pct, but still reached the second highest level in the company's history. Net income for 1956 for the world's largest company reached \$847,396,102. This compares with the 1955 record of \$1,178,548. Ford Motor Co. earnings were off 46 pct.

Printing Equipment Makers Plan Merger

A merger of Intertype Corp. and Harris-Seybold Co., major printing equipment makers, was approved by directors of both firms. The deal awaits stockholder approval.

Congress Asked to Extend Minimum Wage

Secretary of Labor Mitchell told Congress that he favors extending the \$1 an hour minimum wage law to cover 2.5 million more workers, mostly in the retail field. He conceded, however, that most of these are already getting that amount. He opposed labor's recommendation that 10 million more workers be given coverage.

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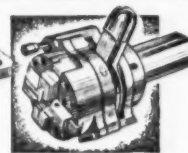
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Determining the Proper Depth of Case in Alloy Steels

In the previous article of this series we discussed the carburizing of alloy steels, pointing out that the purpose of carburizing is to provide a hard, abrasion-resistant outer shell or "case." Such a discussion naturally gives rise to the question, What factors influence the choice of case? Should it be shallow? Medium? Deep or extra-deep?

While it is not always wise to formulate hard-and-fast rules, the following may be used as a general yardstick:

Shallow cases (less than 0.02 in.). Suitable where wear-resistance alone is the chief requirement, and where good surface condition after heat-treating is advantageous. Not suitable if high stresses are apt to be encountered in service.

Medium cases (0.02 to 0.04 in.). For high wear-resistance. Will stand up under substantial service loads and stresses. The thickness is sufficient to permit certain finishing operations, such as light grinding.

Medium-to-deep cases (0.04 to 0.06 in.). For high wear-resistance. A case in this depth range is essential where continuing friction is involved, especially friction of an abrasive or semi-abrasive nature. It is also a good precautionary measure where application of the finished part may sometimes involve crushing action.

Extra-deep cases (more than 0.06 in.). Cases of this depth can be obtained by extending the furnace time in pack carburizing. Highly wear-resistant, they also withstand shock and impact. A large camshaft of an internal-combustion engine is a good example of a part requiring the extra-deep case. This is of course particularly true of the cam lobes themselves.

If you require specific advice concerning case-hardened parts, by all means communicate with our Metallurgical Division. Bethlehem technicians are always on call, and you can depend on their recommendations. And you can depend on Bethlehem, too, when seeking new supplies of alloy steels; for Bethlehem makes the full range of AISI standard grades, as well as special-analysis steels and all carbon grades.

If you would like reprints of this series of advertisements from No. I through No. XVI please write to us, addressing your request to Publications Dept., Bethlehem Steel Company, Bethlehem, Pa. The first 16 subjects in the series are now available in a handy 32-page booklet, and we shall be glad to send you a free copy.

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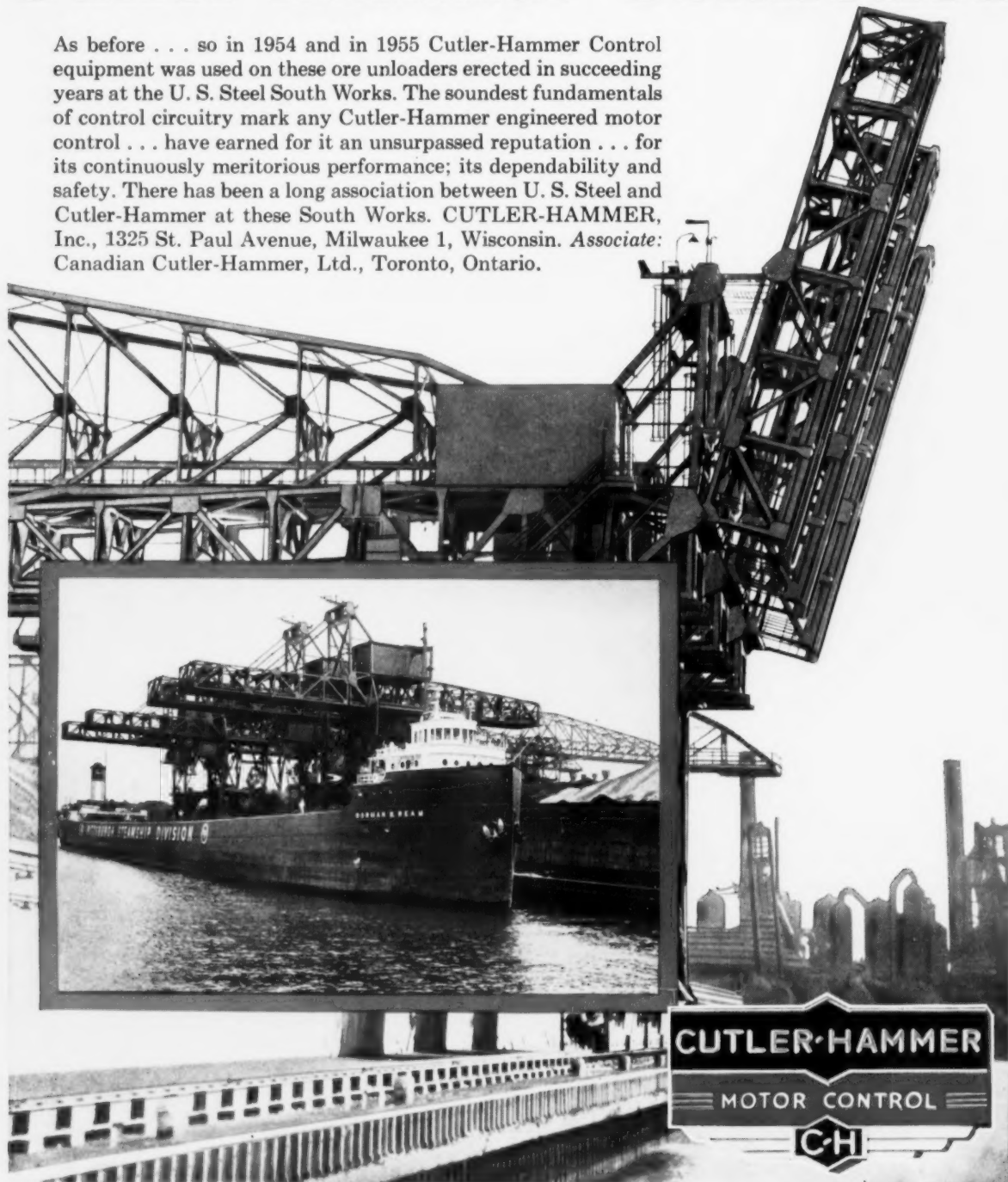
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